Railway Age Gazette

FIRST HALF OF 1916—No. 15 SIXTY-FIRST YEAR

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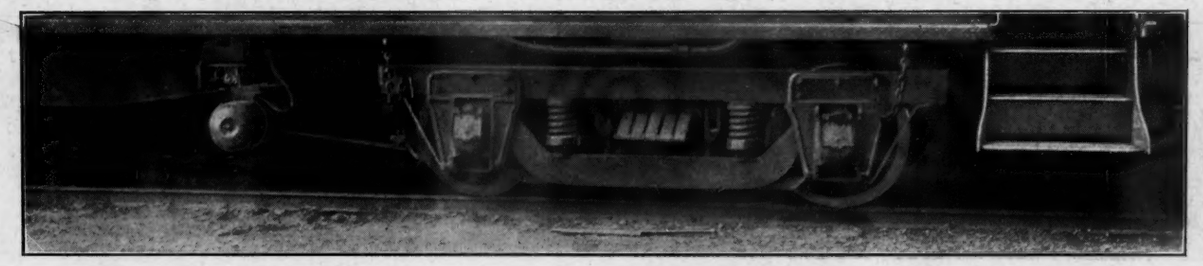

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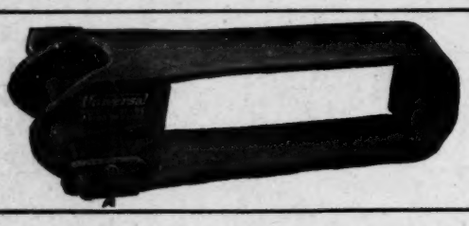

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Railway Age Gazette

Volume 60 April 14, 1916 No. 15

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The Interstate Commerce Commission on April 1 allowed to go into effect temporarily, until June 15, an increase in the demurrage rate from $1 to $2 per car per day for detention of cars after three days following the expiration of the free time. This is the compromise plan agreed upon by the American Railway Association and the National Industrial Traffic League and is intended to relieve the car shortage to some extent by promoting the prompt release of cars by shippers and consignees. There can be no doubt that the principle of a graduated demurrage rate is entirely proper, but it is somewhat doubtful whether the increase which has been allowed is sufficient to show results in the short period allowed for the experiment. The railroads proposed a plan providing for a rate of $1 a day for the first three days after the expiration of the free time, $3 a day for the two succeeding days and $5 a day thereafter, but the plan was modified after conferences with the shippers' committee in order to gain their assent to a joint recommendation to the Interstate Commerce Commission. The proposed rates are those now applied to refrigerator cars, which have had an excellent effect in reducing the detention of that class of equipment. Neither the plan now in effect nor the plan proposed would have imposed any additional penalty for the first three days of detention, but the idea of the progressive increase is especially well adapted to reach the shipper or consignee who ought to be penalized for holding a car out of service and using it for a warehouse when some one else needs it for transportation.

Graduated Demurrage Rate in Effect Temporarily

It is doubtful if there is any other engineering problem of equal importance that is given as little careful consideration on many roads as is the selection of new locomotives; and yet the benefits of designing locomotives to suit conditions under which they are to operate are such that one large road that has gone carefully into the questions of types and designs showed the results of this work in an unmistakable manner in its last annual report. Why will railway officers specify that a locomotive of a certain tractive effort is required, and then leave the matter in the hands of the builders, and a draftsman who is assigned to see that as many as possible of the road's "standards" are included in the design? The locomotive turned out may be satisfactory in many ways; it may give a good performance on low-grade divisions, but does it give an equally good account of itself on sections of the road where the physical characteristics are different? The motive power officer who does not carefully consider all of the conditions obtaining on his road in deciding on new locomotives is not providing the operating department with every means in his power to produce increased and more economical tonnage movement. Not long ago a certain road required new freight locomotives. One type and size of locomotive was recommended for use over the entire system. But the superintendent of motive power took up the matter carefully before the order was placed, and found that the carrying out of this policy would result in either cutting the tonnage over one division or double-heading, the latter resulting in neither of the locomotives operating at nearly full capacity. As the order was finally placed it provided for a reduced number of the locomotives originally recommended and on this particular division, engines of sufficient power to haul through the same tonnage as that hauled on the low-grade divisions. The greatest care in determining the size and type of locomotives is not merely desirable; it is essential if the best operating results are to be obtained.

Locomotives Should Suit Conditions

In commenting on the earnings of railroads for February, in last week's issue, it was pointed out that in addition to operating expenses eastern roads would have to subtract from income the per diem balances running so heavily against them now, and that the western roads would add this per diem to their income accounts. In this connection the New York Central and Pennsylvania were mentioned and it ought to have been added that both of these companies are now making monthly reports of earnings, as is also the Norfolk & Western, which show not only net operating income but deductions from net operating income, other income, interest charges and net income. In these reports, therefore, the subtraction of per diem is made. There has been a great improvement in the form of monthly reports by a number of roads. The New York Central's and the Pennsylvania's are so complete that any one who follows them can get an intelligent opinion of just what the situation is as regards earning expenses,

Reports of Monthly Earnings

fixed charges, etc. The last monthly report of the New York, New Haven & Hartford contained a frank statement of conditions by President Elliott. The Central of Georgia's form showing the amount which is being spent in the territory served each month has been commented on previously in these columns. The statement given out by the Southern Railway is in a form which makes it comprehensible to editors of the daily papers in territory served by the road and easily used as a news item in these papers. If it were a time in which railroad earnings were showing very badly and the roads had some case before the commission it might be thought that it was part of a general policy of putting up a case before the public, but these changes in form of monthly reports, coming as they do when there is no case before the commission, are a sign of the real desire which many railroad presidents have of doing their part in trying to get a better understanding between railroad managements and the public.

"PRODUCTIVE EFFICIENCY"

ONE of the principal arguments which the spokesmen of the train service employees advance for increases in their wages is that what they call their "productive efficiency" has increased. W. Jett Lauck, a witness for them, introduced this theory at length into the arbitration last year of the demands of the engineers and firemen of the western roads. He put it forward again in an article advocating the "basic eight-hour day" which he contributed to a recent issue of the New Republic magazine. "Productive efficiency" as thus used, means the average number of ton miles and passenger miles handled by the railways in a given period per employee of a given class. Mr. Lauck and other spokesmen of the train service brotherhoods contend that not only has the "productive efficiency" of the members of these organizations increased, but that it has advanced faster than their wages, and that therefore the railway companies are "exploiting" them.

It is impossible to accept the assumption on which this theory of "productive efficiency" is based. It is economically unsound. The assumption is that if there has been an increase in the ton miles or passenger miles, or both, handled per employee of any class there has been an increase in the average "productive efficiency" of the members of that particular class, and that they should have their wages increased accordingly. But, as a matter of fact, the amount of traffic handled per employee of any class, or of all classes, depends chiefly on the efficiency of the management and of the organization as a whole, and on the character of the facilities and equipment provided by those whose capital is invested in the railways. If the locomotive engineer is given a larger and more powerful engine to operate, the number of ton miles hauled by him will, of course, increase; but to attribute the increase to his "productive efficiency" rather than to that of his engine, is absurd. Every improvement in a railway's plant or operating methods should, and does, increase the number of ton miles and passenger miles moved per employee of almost every class; and, for the engine and train service employees to claim that such increases are due to increases in their "productive efficiency" is simply an example of the egotistical presumption sometimes manifested by these "aristocrats of labor."

Unquestionably, for social reasons, the wages of those employed in any industry should increase as the amount produced in that industry in proportion to the number of persons employed in it increases; but, ordinarily wages should not increase as fast as, or faster than, increases in the product per employee, simply because this would prevent reductions or cause increases in labor costs per unit of product, and therefore render impracticable any considerable reductions or cause increases in prices to the public. This would tend to deprive the public of all the benefits of industrial progress.

However, while the *Railway Age Gazette* rejects, as unsound in principle, this so-called "productive efficiency" theory, it intends to accept it, for the sake of argument, and to show that, *on their own theory,* most of the train service employees who are now asking for increases in their wages, are not only not entitled to them, but, on their own theory, should have their wages reduced. We intend also to show what, on their theory, has been the relationship between the increases in the "productive efficiency" and in the wages of all classes of railway employees.

Accepting then, for the sake of argument, the theory that increases in the traffic handled per employee are due to increases in the "productive efficiency" of the employees, the first thought that naturally suggests itself is that not only the engine and train service employees who are asking for increases in their wages, but also the other 82 per cent of railway employees may possibly deserve some credit for the increases in the amount of traffic handled by the railways per employee which have occurred. For every employee, from the chairman of the board down to the track walker, contributes his share toward the handling of the traffic. The man who raises the capital for the railway, the man who solicits the traffic, the one who stows it in the freight car, the train despatcher who issues orders to the train crews, the section foreman who maintains the track over which the trains run, the man who unloads freight at the station, the one who keeps a record of it in the general office, are all just as much concerned with the movement of traffic as those on the engine and in the caboose. Let us see, then, how the increases in the "productive efficiency" of the engine and train service employees have compared with the increases in the "productive efficiency" of other classes of railway employees; and also how the increases in their wages have compared with the increases in those of other employees.

The statistics of the Interstate Commerce Commission enable us to ascertain these facts. The latest complete annual statistics of the Commission are those for the fiscal year 1914; and we have divided the 16 years ended with 1914 into two equal 8-year periods, one being from 1898 to 1906, inclusive, and the other from 1906 to 1914, inclusive. The year 1906 has been made the dividing line because it was in that year the great movements for increases in wages began. The statistics in the accompanying tables show what were the increases in the number of ton miles and in the number of passenger miles per employee of all classes and of each class during these periods, and also what were the increases in the average wages of all and of each class.

TON MILES PER EMPLOYEE PER YEAR

	1898	1906	Increase per cent, 1898–1906	1914	Inc. per cent, 1906–1914	Inc. per cent, 1898–1914
All employees	130.443	141,898	8.8	170,052	19.8	30.3
General and other officers.	12,856,500	16,872,024	31.2	18,949,713	12.3	47.4
All employees except general and other officers..	131,778	143,102	8.6	171,592	19.8	30.2
General office clerks	4,249,491	3,773,423	11.2*d*	3,332,099	11.7*d*	21.6*d*
Station agents	3,716,003	6,178,522	66.3	7,574,807	22.6	103.9
Other station men	1,451,313	1,555,560	7.2	1,767,749	13.7	21.8
Engineers	3,006,842	3,606,675	19.9	4,698,442	30.3	56.4
Firemen	2,930,702	3,444,232	14.1	4,481,540	30.1	52.9
Conductors	4,244,589	4,913,455	16.3	6,054,469	23.2	43.3
Other trainmen	1,703,464	1,812,772	6.4	2,122,285	17.1	24.6
Machinists	3,956,631	4,211,998	6.4	5,127,054	21.7	29.6
Carpenters	2,825,521	3,382,070	19.7	3,968,069	17.3	40.4
Other shopmen	1,144,013	1,079,712	5.6*d*	1,127,752	4.4	1.4*d*
Section foremen	3,707,307	5,335,109	43.9	6,540,239	22.6	76.4
Other trackmen	618,327	627,932	1.5	867,171	38.1	40.2
Switchmen, crossing tenders and watchmen	2,420,795	4,347,199	79.5	7,653,629	76.1	216.1
Telegraph operators and despatchers	5,072,820	5,981,644	17.8	7,138,575	19.3	40.7
Other employees and laborers	1,086,225	1,042,635	4.0*d*	1,180,550	13.2	8.7

PASSENGER MILES PER EMPLOYEE PER YEAR

	1898	1906	Increase per cent, 1898–1906	1914	Inc. per cent, 1906–1914	Inc. per cent, 1898–1914
All employees	15,299	16,543	8.1	20,975	25.7	36.0
General and other officers.	1,506,703	1,966,959	30.5	2,317,351	17.8	53.8
All employees except general and other officers..	15,456	16,683	7.9	20,984	25.2	35.8
General office clerks.....	498,414	439,910	11.8*d*	407,488	7.4*d*	18.5*d*
Station agents	435,842	720,301	65.3	926,319	28.6	112.3
Other station men.....	170,222	181,349	6.5	216,177	19.2	27.0
Engineers	352,669	420,470	19.2	574,570	36.6	62.2
Firemen	343,736	401,516	16.8	548,045	36.6	59.4
Conductors	497,843	572,816	15.1	740,377	29.2	48.7
Other trainmen	199,796	211,335	5.8	259,534	22.8	29.9
Machinists	467,534	491,039	5.0	626,985	27.7	34.1
Carpenters	331,399	394,285	18.9	485,253	23.7	46.4
Other shopmen	134,179	125,879	6.2*d*	137,521	9.2	2.5
Section foremen	434,823	621,892	43.0	799,802	28.6	83.9
Other trackmen	72,522	73,205	0.9	106,047	44.9	46.2
Switchmen, crossing tenders and watchmen.....	283,930	506,801	78.5	935,958	84.7	229.6
Telegraph operators and despatchers	594,981	697,347	17.2	872,973	25.2	46.7
Other labor	127,401	121,551	4.6*d*	144,369	18.8	13.3

AVERAGE EARNINGS PER EMPLOYEE PER YEAR

	1898	1906	Increase per cent, 1898–1906	1914	Inc. per cent, 1906–1914	Inc. per cent, 1898–1914
All employees	566.06	592.10	4.6	810.04	36.8	43.1
General and other officers.	2,195.98	2,249.44	2.4	2,918.47	29.7	32.9
All employees except general and other officers..	549.34	578.05	5.2	790.96	36.8	43.9
General office clerks.....	739.78	720.64	2.6*d*	868.71	20.5	17.4
Station agents	576.31	646.00	12.1	821.89	27.2	42.6
Station men	511.99	509.47	0.5*d*	667.95	31.1	30.4
Engineers	1,167.87	1,246.14	6.7	1,771.81	42.2	51.6
Firemen	647.38	705.95	9.0	1,037.47	46.8	60.2
Conductors	979.18	1,079.24	10.2	1,533.62	42.1	56.6
Other trainmen	591.28	687.60	16.3	1,023.21	48.8	73.0
Machinists	676.61	786.80	16.3	1,031.85	31.1	52.5
Carpenters	593.23	641.72	8.2	827.24	28.9	39.5
Other shopmen	515.05	557.79	8.3	747.54	34.0	45.1
Section foremen	559.73	581.26	3.9	767.36	32.0	37.1
Other trackmen	310.59	326.35	5.1	440.01	34.8	41.7
Switchmen, crossing tenders and watchmen.....	565.19	562.62	0.4*d*	605.78	7.7	7.2
Telegraph operators and despatchers	634.08	685.22	8.1	904.42	31.9	42.6
Other employees and laborers	496.13	522.54	5.3	726.22	38.9	48.4

The tables disclose the fact, which probably will surprise many people, that both during the last eight years and during the last 16 years for which we have complete statistics, the average wage per year of all railway employees increased more than the average traffic handled—the "productive efficiency"—per employee. During the eight years, 1898-1906, inclusive, the increases in freight and passenger traffic handled were greater in proportion than the increase in the average wage per employee; but in the eight years ending with 1914 the increase in the average wage was so much greater than the increase in the average traffic handled per employee as to make the increase in wages for the entire 16 years relatively greater than the increase in the traffic handled. During the 16 years the increase in ton miles handled per employee—excluding offices—was 30.2 per cent and in passenger miles, 35.8 per cent; while the increase in the average wage per employee was 43.9 per cent.

Let us turn now to those classes whose spokesmen are using the "productive efficiency" theory as an argument for increases in their wages. These are the engineers, firemen, conductors and other trainmen. The statistics show that during the last eight years covered the increase in the average wage of every one of these classes was greater than the increase in its so-called "productive efficiency." The ton miles handled per engineer per year increased 30.3 per cent; passenger miles, 36.6; and wages 42.2 per cent. The increases for the other train service employees were:

Firemen, ton miles, 30 per cent; passenger miles, 36.6 per cent; wages, 46.8 per cent.

Conductors, ton miles, 23.2 per cent; passenger miles, 29.2 per cent; wages, 42.1 per cent.

Other trainmen, ton miles, 17.1 per cent; passenger miles, 22.8 per cent; wages, 48.8 per cent.

Furthermore, the average wage of every one of these classes, except engineers, increased more throughout the 16 years than did their so-called "productive efficiency," as may be seen by a glance at the tables. The extreme example is afforded by the other trainmen. The increases for them during the entire 16 years were: Ton miles, 24.6 per cent; passenger miles, 29.9 per cent; wages, 73 per cent. And yet the brakemen, as well as the other train service employees, are threatening to strike if they do not get an increase in wages, based on the increase in their "productive efficiency"!

We shall next examine the figures regarding the increases in the "productive efficiency" and wages of some of the remaining 82 per cent of railway employees who are not making any demands and threatening to tie up the industry of the country. Take, for example, station agents. The increases in the traffic handled and in the wages per station agent during these 16 years were: Ton miles, 103.9 per cent; passenger miles, 112.3 per cent; wages, 42.6 per cent. The station agents have not done so badly in the matter of increases in wages; but compare the increase in their "productive efficiency" and in their wages with the increases in those of the train service employees, and then decide, gentle reader, who, on this theory, is entitled to the next advance in wages.

We come now to the case of the section foreman. The average increases for this class of employees during the 16 years were as follows: Ton miles, 76.4 per cent; passenger miles, 83.9 per cent; wages, 37.1 per cent. On the theory of "productive efficiency" ought not something to be done for the section foreman before the train service employees again receive consideration? As a matter of fact, on this theory, part of the increases in wages which already have been given to the train service employees should be withdrawn and turned over to the station agent and the section foreman.

Then consider the case of switchmen, the crossing tenders and watchmen. The increases in the average traffic handled and in the average wages of the members of this class in the 16 years were: Ton miles, 216 per cent; passenger miles, 229.6 per cent; wages, 7.2 per cent. Here is another class which increased its "productive efficiency" enormously more than the train service employees, while getting an enormously smaller increase in wages.

Finally, let us do something for the officers of the railways. The spokesmen of the train service employees, nothing loath to blacken the reputations of the concerns from which they get their money, are giving out stories regarding the "fancy salaries" of the officers and implying that if the railways did not give away so much of their money to the favored few there would be more to divide among those in train service. The statistics show, however, that the "productive efficiency" of the officers, unlike that of the train service employees, has been increasing faster than their wages. During the 16 years under review the increases in traffic handled and in wages per officer on the average were: Ton miles, 47.4 per cent; passenger miles, 53.8 per cent; wages, 32.9 per cent. Furthermore, the wages of all the officers constituted in 1914 only three per cent of the total wages paid, while those of the train service employees were 28 per cent of the total paid. Therefore, we suggest that on the basis of "productive efficiency" not only are the officers better entitled to an increase of 25 per cent in their pay than the train service employees, but that it would be more economical; for such an increase in their pay would cost only $11,000,000 a year, while a 25 per cent increase in that of the train service employees would cost $100,000,000 a year.

The theory of "productive efficiency" must be treated rather lightly because it is economically unsound; and even ridiculous; and yet the foregoing statistics, which have been given mainly to show how untenable, even on their own theory, is the position of the train service employees, do

throw light on a serious and even ominous tendency in the railway industry. They show that the average wage per employee has been increasing faster than the average traffic handled per employee. This means that the labor cost of handling each unit of traffic has been increasing—a statement which applies with especial force to the very classes of employees who are now asking for another increase of $100,000,000 a year. It was mainly owing to this increase in the cost of labor per unit of traffic handled that between 1906 and 1914 the amount required to pay railway operating expenses advanced from 66 cents out of every dollar earned to 72.2 cents out of every dollar earned, and that the percentage of return earned on investment in property declined from 5.39 per cent to 3.99 per cent.

The statistics and the general conditions in the railway industry make it evident that even though we could accept the train service employees' theory of "productive efficiency" as sound, the time has come when the "productive efficiency" of most railway employees should be given a chance to catch up with their wages; and this is especially true as to the train service employees whose increases in wages have for years, and especially during the last 10 years, been completely out-stripping the increases in their "productive efficiency."

INCREASING THE PRICE OF RAILS

THE statement made last week by Judge Gary of the United States Steel Corporation that the subsidiary companies of the corporation had decided to maintain the present prices for rails unil May 1, 1916, for rails sold for delivery up to May 1, 1917, has been interpreted by many railway men as forecasting an increase in these prices after the end of this month. The stability of the present quotations for rails, in contrast with the wide fluctuation in prices of other steel products during recent months, has been the subject of much comment. This statement of Judge Gary and the interpretation properly to be put upon it are subjects of interested conjecture. Immediately following the organization of the steel corporation, the basic price for Bessemer rails was fixed at $28, and the corporation has been chiefly instrumental in maintaining this price continuously since that date through times of business depression and industrial activity alike.

Conditions in the steel industry are abnormal and entirely without precedent, and the end does not yet appear to be in sight. The tonnage of unfilled orders on the books of the steel corporation on March 31 established a new record with a total of 9,331,001 tons, or over double that of one year ago. The increase in the tonnage of unfilled orders during the month of March alone amounted to 762,035 tons. Most of these orders have been placed in spite of the high prices now prevailing and the impossibility of securing early delivery.

Considering present conditions only, an increase in the price of rails would appear to be reasonable in view of these extraordinary conditions. But it must be remembered that the quotations for rails have not reflected business conditions for the last 15 years. On their own initiative the steel makers inaugurated the fixed prices and have maintained them up to the present time. In this way they benefited during the long period of depression which followed the panic of 1907 when the prices of other steel products fell below normal. The steel makers have defended this policy by pointing to the fact that they did not raise the prices during the preceding period of business activity. To raise the prices during a period of prosperity after maintaining them during the recent depression would be criticized as inconsistent. It seems doubtful if this is the intention, in view of the fact that one-half of the 1917 requirements has already been ordered and that by the time the roads are prepared to order rails for use during 1918 the conditions causing the present situation in the steel industry will very probably have been removed or at least materially altered.

Some of the manufacturers have pointed to increased costs of producing rails resulting from the stricter specifications required by the roads as a justification for an increase in prices. It is undoubtedly true that some of the requirements recently specified have added to the cost of production, but enforcement of these specifications has been accompanied in nearly every instance by the payment of premiums above the basic prices, amounting to several dollars per ton in some instances. On the other hand, it is undoubtedly true that present abnormal conditions tend strongly to increase current costs of production.

It has been intimated that the manufacturers expect an influx of foreign orders for rails after the close of the European war and are now planning to raise domestic prices to a level with those which are expected to prevail for rails for export. This would not appear to be entirely fair, in view of the fact that in the past domestic prices have often been higher than those for export.

For several years there have been serious differences between the rail manufacturers and the railways regarding the quality of the rails the latter have secured. Although these differences have not disappeared, at no time in recent years has there been as much co-operation between the railways and the manufacturers as at the present time. It would seem that an increase of prices would tend to make the differences between the two parties acute again.

CENTRAL OF NEW JERSEY AND PHILADELPHIA & READING

UNTIL the death of the late George F. Baer the Philadelphia & Reading and the Central of New Jersey were both under Mr. Baer's management, with W. G. Besler as vice-president in charge of operation of the Central of New Jersey and Theodore Voorhees as vice-president in charge of operation of the Philadelphia & Reading. After Mr. Baer's death Mr. Besler became president of the Central of New Jersey and Mr. Voorhees of the Philadelphia & Reading. The fiscal year ended June 30, 1915, was the first full year of operation under the new presidents, and since in the years previous the active management of each property had been under the same direction as in 1915, no change of policy is apparent. The Central of New Jersey and the Philadelphia & Reading are both controlled by the Reading Company. The roads are not competitive, but complementary. The Central of New Jersey operates 681 miles of road, of which 262 miles has second track. The Philadelphia & Reading operates 1,120 miles of road, of which 527 miles has second track.

The total tonnage of freight carried by the Central of New Jersey was 31,515,000 in 1915, and of the Philadelphia & Reading, 51,128,990 tons. Of the total tonnage of the Philadelphia & Reading 56.27 per cent was furnished by products of mines, which included 9,318,000 tons of anthracite coal, or 29.57 per cent of the total tonnage of revenue freight, and 6,197,000 tons of bituminous coal, or 19.66 per cent of the total tonnage of revenue freight. Of the total tonnage of the Philadelphia & Reading, 65.9 per cent was furnished by products of mines, which included 11,695,000 tons of anthracite coal, or 22.4 per cent of the total revenue tonnage, and 17,553,000 tons of bituminous coal, or 34.3 per cent of the total revenue tonnage. Tonnage of manufactures forms about the same proportion of the total for each road—14.69 for the Central of New Jersey and 14.9 for the Philadelphia & Reading. Of the total tonnage of the Central of New Jersey, 15,174,000 tons originates on the company's lines and 16,341,000 tons on other lines, while

on the Philadelphia & Reading 7,523,000 tons originates on line and 43,606,000 tons off line.

Total operating revenues for the Central of New Jersey in the fiscal year ended June 30, 1915, amounted to $28,742,000, a loss as compared with the previous year of $508,000. Total operating revenues for the Reading amounted to $46,715,000, a loss of $2,578,000. Total operating expenses for the Central of New Jersey amounted to $18,951,000, a decrease of $791,000; and for the Philadelphia & Reading to $31,125,000, a decrease of $2,244,000. In other words, the Central of New Jersey made a larger saving in expenses than its loss in revenue, and the Philadelphia & Reading almost offset its loss in revenue by its saving in expenses. Both roads made large reductions in expenditures for maintenance of way, the Central of New Jersey spending $2,550,000 in 1915, or $828,000 less than in 1914, and the Philadelphia & Reading $4,651,000, or $685,000 less than in 1914. It will be noted that the Central of New Jersey's cut in maintenance expenditures was proportionately much heavier than that of the Philadelphia & Reading. On the other hand, the saving made by the Central of New Jersey in transportation expenses was much less than that made by the Philadelphia & Reading, in part, of course, due to the fact that there was not so large a falling off in business on the Central as on the Reading. Transportation expenses on the Central of New Jersey were $9,846,000 in 1915, a decrease of about $52,000, or less than one per cent, with a loss in revenue of between one and two per cent. The Philadelphia & Reading transportation expenses in 1915 were $15,759,000, a saving of $894,000, or 5.5 per cent, with a reduction in total operating revenues of almost exactly the same per cent. The average revenue freight-train load on the Central of New Jersey was 566 tons in 1915, comparing with 555 tons in 1914, an increase of 11 tons. The Philadelphia & Reading revenue trainload in 1915 was 605 tons, comparing with 580 tons in the year 1914, an increase of 25 tons.

It is rather interesting to note in this connection that the average number of loaded cars per train for the Central of New Jersey was 21.11 in 1915 and 20.12 in 1914; and for the Philadelphia & Reading, 21.35 in 1915 and 20.39 in 1914, notwithstanding the fact that the Philadelphia & Reading has 3,254 coal cars of 25-ton capacity, 9,173 of 30-ton capacity, and 5,410 of 50-ton capacity, while the Central of New Jersey has no 25 to 30-ton coal cars, only 528 of 30 to 35-ton capacity, and 9,795 of 40 to 45-ton capacity and 4,998 of 50 to 55-ton capacity. The largest items of saving in transportation expenses which the Philadelphia & Reading made were in fuel for train locomotives and in wages of trainmen, and a decrease of 30 per cent in the payments for injuries to persons.

The following table shows the principal figures for operation for the two roads in the fiscal years ended June 30, 1915, and June 30, 1914:

	C. of N. J.		P. & R.	
	1915	1914	1915	1914
Mileage operated	681	678	1,584	1,584
Freight revenue	$2,136,162	$2,368,564	$36,596,908	$38,364,263
Passenger revenue	5,487,221	5,856,390	6,425,634	7,011,549
Total operating revenues	28,742,256	29,251,093	46,714,822	49,293,104
Maint. of way and struct's	2,550,456	3,378,809	4,651,073	5,336,464
Maint. of equipment	5,347,465	5,220,589	8,370,290	8,920,290
Traffic expenses	346,288	311,048	546,794	519,858
Transportation expenses	9.845,624	9,897,358	15,758,752	16,653,018
Miscellaneous expenses	149,435	173,403	.....	.....
General expenses	599,273	557,788	869,431	877,966
Transportation for investment—Cr.	4,113	.....	.....	.....
Total operating expenses	18,951,307	19,741,845	31,125,387	33,368,924
Taxes	1,433,126	1,338,797	1,166,688	1,267,503
Operating income	8,357,126	8,169,794	14,416,848	14,656,676
Gross income	12,045,894	13,040,013	15,272,332	15,475,397
Net income	5,312,178	5,723,935	6,528,850	7,426,621
Additions and betterments	.....	.....	1,161,691	2,024,783
Dividends	3,292,416	3,292,416	5,367,159	5,401,838
Surplus	2,019,762	2,431,518	.....	.....

LONG ISLAND

THE operation of the Long Island is analogous in many ways to the operation of a large terminal yard through which a very heavy suburban passenger service has to pass as well as the terminal services performed for freight. Terminal expenses have the undesirable distinction of having risen more rapidly even than any other class of railroad expenses. To offset these runaway costs the Long Island has for years been spending very large sums of new capital to make its plant give the service required at the minimum expenditure for transportation and maintenance expenses. By no means all of the improvements which are being made through the investment of additional capital have as yet begun to effect the full saving which may be expected from them when the management's plans have been fully carried out. It is an encouraging fact, however, that in the calendar year ended December 31, 1915, the Long Island, handling over one per cent more tons of freight one mile and nearly one per cent more passengers one mile, did this business at a transportation expense almost 4 per cent smaller than the transportation expense in the previous year.

Total operating revenues amounted to $13,554,000, or $271,000 more than in 1914, and total operating expenses amounted to $9,127,000, a decrease of $36,000. Had taxes not increased by $152,000, the company would have just about broken even after the payment of its interest charges. As it was the net deficit was $161,000, comparing with a net deficit in 1914 of $333,000. Transportation expenses amounted to $5,500,000, or $225,000 less than in 1914. This saving in transportation expenses was in part offset by increased expenditures for both maintenance of way and maintenance of equipment, as is shown in the table at the end of these comments.

There is no other important American railroad that has as large a proportion of its revenue derived from passenger business as the Long Island. The total number of passengers carried one mile in 1915 was 609,564,000; the total number of tons carried one mile was 106,906,000. As would be expected on a road doing a large suburban business, the passenger-mile rate is very low—1.318 cents in 1915. As would also be expected on a road doing a freight business analogous to the operation of a vast terminal yard, the freight revenue per ton per mile is very high—3.619 cents in 1915. This makes, of course, a very high revenue per freight-train mile—$7.37 in 1915; and also because of the character of the business, very high expenses per revenue train-mile. The company estimated the freight-train expenses at $4.23 per mile in 1915. The estimated net revenue per train-mile in freight service was $3.14; in passenger service, 20 cents.

This comparison as between freight and passenger service of net revenue per train-mile throws a rather interesting light on a suit which is now pending against the Long Island and its directors. The suit was brought by a stock brokerage house after the Pennsylvania had refused to buy, at the asking price, a block of minority stock which the brokers had offered. The claim made in the suit is that the heavy capital expenditures which the Long Island has made in recent years are in reality in the interests of the Pennsylvania Railroad, which owns a majority of the Long Island stock. About the only way in which the Long Island could be of service to the Pennsylvania is in connection with the Long Island's freight business. No advantage can accrue to the Pennsylvania through the development of suburban passenger business on Long Island. Notwithstanding this fact, by far the greater part of the capital expenditures which have been made have been in connection with the betterment of passenger service. The effect of the improved facilities for passenger service are plainly shown in

1915. Net revenue per passenger per mile was 5.7 mills, an increase as compared with the previous year of 97 per cent.

The Long Island operates 397 miles of road. The average passenger journey is 14 miles and the average haul of freight is 24 miles. The average number of passengers per train-mile in 1915 was 115, an increase of 3.95 as compared with 1914, and the average trainload of freight was 200 tons, an increase of nearly 5 tons. The total tonnage of freight carried by the Long Island in 1915 was 4,443,000, a decrease as compared with the previous year of 37,000 tons. The increase in ton mileage mentioned above is accounted for by a longer average haul. Of the total tonnage over 9 per cent is less than carload freight. Anthracite coal furnished over a quarter of the total tonnage, and the commodities which furnished the largest proportion of the remainder were cement, brick and lime, 283,000 tons; lumber 277,000 tons; stone and sand, 258,000 tons, and fruit and vegetables, 184,000 tons. With the falling off in the tonnage of most of the commodities named there was an increase in the tonnage of less than carload freight of more than 100 per cent. This makes the reduction in transportation expenses all the more notable.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Mileage operated	397	398
Freight revenue	$3,865,746	$3,739,568
Passenger revenue	7,951,322	7,899,972
Total operating revenues	13,553,780	13,282,930
Maint. of way and structures	1,529,223	1,457,509
Maintenance of equipment	1,517,410	1,450,283
Traffic expenses	128,898	141,850
Transportation expenses	5,499,680	5,724,434
Miscellaneous expenses	77,513	43,312
General expenses	374,197	345,088
Total operating expenses	9,126,922	9,162,478
Taxes	934,822	782,502
Uncollectible revenues	5,435	2,102
Operating income	3,486,602	3,335,879
Gross income	4,220,227	3,982,869
Net deficit	161,150	494,131

NEW BOOKS

Sound Investing. By Paul Clay. 371 pages, 5 in. by 7 in. Limp leather. Published by Moody's Magazine & Book Company, New York.

Mr. Clay has been connected with Moody's Investors Service. In Sound Investing he gives a description of the various classes of investments represented by corporation or government securities. He then describes in a general way the class of investment which is proper for various kinds of investors. The preface says that the book is primarily intended as a reference work, the idea being that a person considering making an investment should read first the chapter on investments suitable to a person in his circumstances, and then read the chapters on each of the class of securities which might be suitable in Mr. Clay's judgment for him to invest in. The general principles which should guide in the examination of the value of securities as an investment are lucidly explained. Mr. Clay's classification of investments is sound and the pitfalls of certain classes of investment which he points out are real dangers against which prospective investors ought to be warned. Although intended as a book of reference it is simply written and quite readable It will not make a wise investor out of a man with poor judgment, but it should be of very considerable help to men or women who desires to have some knowledge of their own by the light of which to examine investments which are offered to them by their bankers or by a bond house. A great deal of money could be saved by people who can ill afford to lose money if the chapter on the investments suitable for salaried people, by which Mr. Clay means people earning $4,000 or less, could be read and believed in by the thousands of men and women who each year put some of their hard-earned savings into wild-cat mining stock and like ventures.

Letters to the Editor

AIR BRAKE ASSOCIATION

SALIDA, Colo.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

As president of the Air Brake Association, I would like to place before administrative and operating officers a matter which I believe materially affects the earnings and expenditures of all railways of this country. I refer to a better maintenance of air brakes and broader consideration of the men who work in that field. Many millions of dollars have been spent by the railroads to equip freight cars with air brakes, and more money must be spent for air brake maintenance. The first cost of attaching air brakes to cars does not end the matter. Maintenance cost must necessarily follow and be considered as with all mechanisms. The air brake problem of the present resolves itself into obtaining the most efficient service at the lowest cost.

The Air Brake Association was organized twenty-three years ago "to improve air brake service on American railroads." That this service has been improved, and that this result has been achieved largely through the work of this association, is a well known and generally recognized fact. Nor is the organization's work yet finished. From the early rescue of the few air brakes installed (and which had drifted into disuse) up to the present time of practically 100 per cent of air braked trains, the rules and practices of maintenance have come fundamentally from the Air Brake Association, with varying and sometimes indifferent support of the railroads. These rules and practices have evolved from the interchange of ideas of practical brake men attending the conventions.

I would respectfully solicit the interest of administrative and operating officers personally to the end that they sanction and urge the sending of their air brake men to the convention of this association, which will be held in Atlanta, Ga., May 2, 3, 4 and 5. Not only the general air brake inspectors, but also the subordinate air brake men who handle the inspection and maintenance work in the yards and shops should attend. Usually the air brake man is obliged to pay half fare to the convention, pay his expenses while there, and lose his time while away from work; and this, too, to gather information which he takes home and puts into practice to the benefit of his railroad. The Air Brake Association conventions have always been interesting, instructive and enthusiastic meetings, although attendance has suffered somewhat in the past two or three years, owing to business conditions in the railroad field. For the safety it promotes and for the saving in operating expenses it brings, this association deserves the better support of administrative and operating officers. Any good air brake man who puts into practice on his road the knowledge he obtains at these conventions will many times repay his company for sending him and paying the proper expenses of the trip. J. T. SLATTERY.

EXPORTS OF RAILWAY MATERIAL FROM THE UNITED KINGDOM.—During the month of February 6,720 tons of iron and steel in railway material, to the value of $400,000 were exported, as against 23,413 tons in the corresponding month of 1915, and 43,964 in 1914. The value of the locomotives exported was $500,000, as against $900,000 in 1915 and $1,900,000 in 1914. Railway passenger cars exported were of the value of $125,000, as against $300,000 in 1915 and $375,000 in 1914. Freight cars to the value of $130,000 were exported in 1916, as against $650,000 in 1915 and $1,350,000 in 1914.

A Less-Than-Carload Clearing House

A Suggested Solution of the Problem of Handling L. C. L. Traffic at Chicago. Present Methods Inefficient

By Henry A. Goetz

The movement of l. c. l. traffic in the Chicago district, and especially the interchange traffic, presents a very serious problem to the Chicago railroads, and one which presses for solution more emphatically year by year. Any effective reform means a more or less radical departure from present practices, and this, together with the difficulty of securing harmony of action, has heretofore inspired the roads to approach this subject by such expedients as have been best adapted to their own peculiar conditions, and necessarily without relation to the problem as a whole. The time is

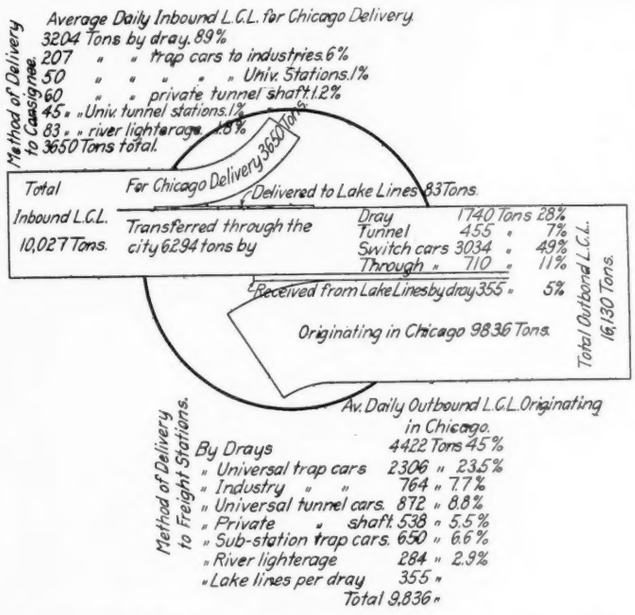

Average Daily Inbound L.C.L. for Chicago Delivery
3204 Tons by dray. 89%
207 " " trap cars to industries. 6%
50 " " " " " Univ. Stations. 1%
60 " " private tunnel shaft. 1.2%
45 " Univ. tunnel stations. 1%
83 " " river lighterage. 1.8%
3650 Tons total.
Method of Delivery to Consignee.
Total Inbound L.C.L. 10,027 Tons.
For Chicago Delivery 3650 Tons.
Delivered to Lake Lines 83 Tons.
Transferred through the city 6294 tons by
Dray 1740 Tons 28%
Tunnel 455 " 7%
Switch cars 3034 " 49%
Through " 710 " 11%
Received from Lake Lines by dray 355 " 5%
Originating in Chicago 9836 Tons.
Total Outbound L.C.L. 16,130 Tons.
Av. Daily Outbound L.C.L. Originating in Chicago.
Method of Delivery to Freight Stations.
By Drays 4422 Tons 45%
" Universal trap cars 2306 " 23.5%
" Industry " " 764 " 7.7%
" Universal tunnel cars. 872 " 8.8%
" Private " shaft. 538 " 5.5%
" Sub-station trap cars. 650 " 6.6%
" River lighterage 284 " 2.9%
" Lake lines per dray 355 "
Total 9,836 "

Fig. 1—The Origin and Distribution of Chicago's L. C. L. Traffic

rapidly coming, if it is not already at hand, when the Chicago lines should approach the question in a broad, co-operative manner, and the following suggestions are made with the belief that they offer the basis on which may be built up a permanent and elastic system for the handling of this traffic.

The latest available stastistics indicate that 10,027 tons of l. c. l. freight are received daily in Chicago, of which over 60 per cent, or 6,294 tons, is destined to points beyond the city. This tonnage is usually brought to the terminal inbound house or transfer station and unloaded, the transfer to the connecting line being made as follows: 1,740 tons by wagon, 455 tons by tunnel, 3,034 tons by switch cars, and 710 tons direct in through cars, to the outbound house of the forwarding line.

The daily outbound traffic originating in the Chicago district amounts to 9,836 tons, of which 45 per cent or 4,422 tons is delivered by drays at the "out" freight houses of the various Chicago lines. The remaining 55 per cent or 5,414 tons, is delivered at universal receiving stations, or is handled by industry trap cars, tunnel, river lighters, etc., as will be seen by Fig. 1. Of the total tonnage handled in the Chicago district, not more than 40 per cent originates on or is delivered by the local terminals of the trunk line, representing a strictly local movement. The remaining 60 per cent or over 10,000 tons, is interchanged between two lines and in many cases represents a double or triple handling, between 1,200 and 1,600 cars being handled daily in the movement of this interchanged l. c. l. traffic.

Fig. 2 is a diagram showing a comparison by roads of the inbound l. c. l. freight and that transferred to connecting roads.

The interchange and handling cost has been fixed as high as $1.70 per ton, exclusive of clerical hire. No information has been collected as to the cost of maintaining the large clerical forces necessary for re-billing and the duplication of records, under the present system of waybilling to and from stations of the trunk lines, and interchanging from one road to the other. The present method has the fundamentally bad tendency of drawing a very large portion of this interchange traffic to the down-town city freight depots, which should be reserved strictly for city dray freight. Any proposed plan must contemplate the abandonment of city houses for through business, and permit their exclusive and more intensive use for city business, thus doubling their platform capacity.

As shown in Fig. 3, a number of the trunk lines have already established outside transfer stations. The operation

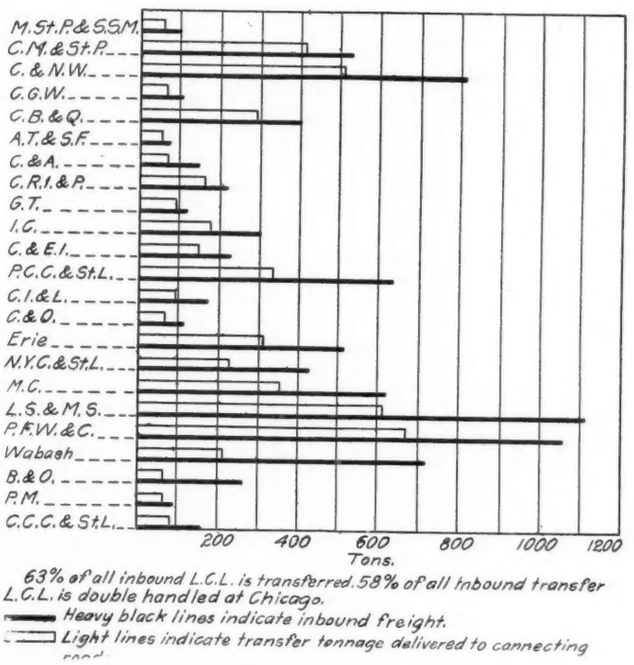


Fig. 2—A Comparison Between the Total Inbound Tonnage and That Transferred

of these scattered stations, as individual units, however, entails a very large number of switching and interchange movements, and the utilization of an unnecessary number of trap and transfer cars. As time goes on and the volume of business increases, this situation will grow worse. This system is not susceptible of development along economical and efficient lines.

Proposed Clearing House Plan

To provide a basis for a broad, co-operative and progressive scheme for the handling of this traffic, it is proposed to

establish, first, an initial clearing house at B (Fig. 3) and later on, as business justifies, others at A and C. This scheme proposes that the clearing house shall be equally accessible to the Belt Railway of Chicago and the Indiana Harbor Belt. It contemplates the ultimate unification of the two belt lines and a common use thereof by all Chicago roads, thus insuring a general and more economical use of the belt lines by the various trunk lines, in a manner best adapted to the conditions and requirements of each road.

Fig. 4 illustrates a general plan for a central clearing freight house. Each road would be provided with ample platforms and track room, with space for future expansion. The initial plant would have 10 platforms, increasing, ultimately to 26. A is an overhead transfer platform, reached by elevators, upon which electric tractors would transport, deliver, distribute and collect all trailer trucks loaded with merchandise, going to and coming from the various loading platforms C, on the lower level. B, B are elevators, each capable of lifting six trailers loaded with merchandise.

C, C are the loading platforms, on one side of which, at D, all inbound switch, dray and trap cars with merchandise destined to go outbound on the roads using those particular platforms are placed. The schedule or transfer cars would be spotted on the opposite side, at E, for loading to roads or to destination. The distributing and loading to stations of the forwarding road would be done by the platform force of each road, while all transfer handling upon the overhead platform A would be done by the clearing house force, at actual cost per ton. F is a possible storage warehouse development, in which the tenants would have unusual carload inbound and less-than-carload outbound shipping advantages.

This clearing scheme is susceptible of being operated by two distinctive methods. Plan A contemplates a transfer house, at which all inbound cars containing merchandise freight destined to connecting roads, break bulk, the merchandise being separated into trap cars and switched to the transfer or terminal outbound house of the forwarding road, where it receives its final distribution and is loaded in cars in station order to destination.

Plan B provides for operation as a clearing house, at which all inbound cars, containing merchandise freight destined to connecting roads, break bulk, the merchandise being separated and delivered to the platform of the participating road, where it receives final distribution, and is loaded into schedule cars in station order, together with the *outbound* freight originating in Chicago, at industries, sub-stations, universal stations, tunnel stations, lighter docks, the municipal pier, lake line docks and union stations, this outbound freight being first loaded into dray cars and switched to Clearing.

These plans in general contemplate that no schedule loading shall be done at the down-town terminal houses. Cars that can be loaded solidly to destination should be so loaded and forwarded, but merchandise to peddler points should be loaded into dray cars and switched to the individual out of town transfer house, under plan A, or to the clearing house, under plan B, where it will meet the transferred freight, and be loaded with it in station order to destination.

A slight re-arrangement of the present practice can be made to suit the conditions of each road, by which a partial schedule setting would be maintained at the down-town houses, while that at Clearing under plan B or that at the outbound transfer houses under plan A will include all stations, thus avoiding the duplication of lightly loaded cars going to the same point.

This clearing plan is so flexible that the participating roads can use either plan, as best suits their own requirements, or a part of the roads can use plan A, while, at the same time, others can use plan B, without interference. Where conditions demand, the larger roads could use plan A or B for transfer freight between roads, and in addition maintain their own outbound schedule house, or houses for loading in station order to destination.

Operating Program at the Clearing House Platforms, Under Plans A or B

At the platforms C will be placed all inbound cars. All freight will be separated and loaded on trailer trucks, to be delivered by tractors, either to the schedule cars spotted on the opposite side of the platform where it is loaded to destination, or via the elevators to the overhead platform A, and then delivered to the connecting road's platform. On arrival at the connecting road's outbound platform C, the tractors operating on that platform will deliver the trailers to the outbound car, where the stowers will load the freight in station order to destination under plan B, or load under plan A, to be switched to connecting road's outbound transfer or terminal station, there to receive final distribution.

No manual trucking is done upon either platform A or C,

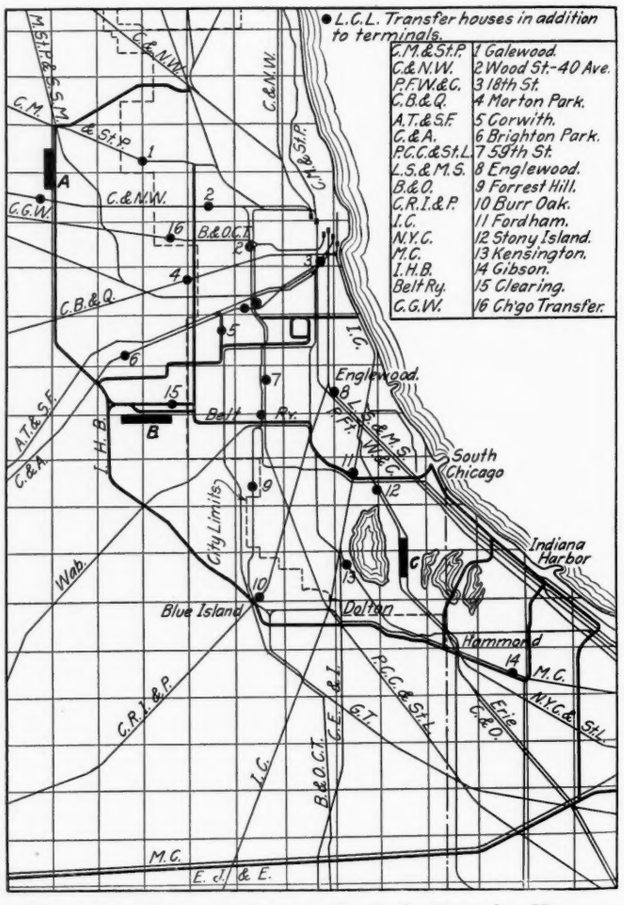


Fig. 3.—Location of Existing L. C. L. Transfer Houses

as all freight is moved by tractors and trailers. It is estimated that the labor handling expense upon the Clearing platforms will be about 30 cents per ton, compared with 90 cents for the double handling expense incurred for handling transferred freight carried through the city by teams, cars, or tunnel, namely, 45 cents at the inbound house and another 45 cents at the outbound house.

The economy effected amounts to a saving of all walking truckers seen at one time upon the freight house floor, each costing 22 cents per hour. (A tractor with one operator hauling 6 trailers can transport 25 times as much as a single trucker, pushing a 2-wheeled truck.)

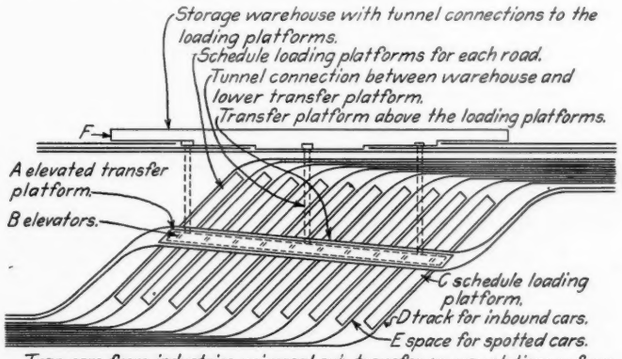
The savings and benefits effected by the clearing scheme are:

1. The doubling of the platform capacity at the down-town

terminal freight houses. (The capacity of the city freight houses has been outgrown, and additional land is not available in the down-town district, except at a prohibitive and constantly increasing expense. The interest charge alone on such property would be equivalent to $0.50 to $1 per ton of freight handled.)

2. A saving of $1.40 per ton on 2,195 tons of transfer freight now daily hauled by teams and tunnel or $3,073.00. (Freight transferred by team or tunnel meets with a labor cost of 45 cents per ton at the inbound house, 80 cents per ton expense for transferring by team or tunnel and 45 cents per ton platform expense at the outbound house, for reloading to destination, a total of $1.70 per ton. This same class of freight handled at the clearing station would meet with but one handling cost of 30 cents per ton. Assuming that the switching expense from the inbound break-up yard is the same to Clearing as it is to the down-town freight houses, there will be a net saving of $1.40 per ton. The above saving of $1.40 per ton is conditional upon schedule loading being done at Clearing, under plan B.)

3. A saving of $1.10 per ton on 3,034 tons of transfer freight now handled by switch cars to connecting lines or $3,337.40. (Fig. 3 gives the location of the various individual


Storage warehouse with tunnel connections to the loading platforms.
Schedule loading platforms for each road.
Tunnel connection between warehouse and lower transfer platform.
Transfer platform above the loading platforms.
F
A elevated transfer platform.
B elevators.
C schedule loading platform.
D track for inbound cars.
E space for spotted cars.

Trap cars from industries, universal, sub, transfer or way stations or from down town terminal freight houses, if loaded to a single road, are placed at the track level platform "C," if loaded to two or more roads, are placed next the transfer platform above the tracks "A". Freight from the adjacent warehouse is delivered via electric tractors and trailer trucks to the transfer platform beneath the tracks.

Fig. 4.—Proposed Track Layout Showing Initial Installation of 10 Platforms. Plans Provides for 23 Platforms Ultimately.

outside transfer and break bulk houses, which, under the clearing plan, it will be unnecessary to maintain, since the cars now handled at these houses will be sent direct to the clearing house, thus saving one labor handling of 45 cents per ton at the transfer platform, a switching expense of 50 cents per ton in switching to each connecting line, and 45 cents at the outbound house, a total of $1.40, compared with 30 cents for labor handling at Clearing, making a saving of $1.10 per ton. In this estimate, it is assumed that the first switching expense from the inbound break-up yard to the down-town outbound house or to the outbound transfer house would not exceed the switching expense to the clearing house.)

4. A saving of 15 cents per ton on 710 tons of transfer freight handled by through cars or $106.50. (On through cars that arrive at outbound houses with merchandise ready for distribution, it is assumed that the switching expense from the break-up yard to Clearing, or the terminal outbound house, is the same. The saving effected is 15 cents per ton, the difference between 45 cents labor cost at the terminal house and 30 cents at the clearing house.)

5. A saving of 50 cents per ton absorption expense on 1,500 tons from universal stations or $750. (At present, many industry cars are switched to universal houses, to be reloaded into trap cars and re-switched to 23 down-down outbound houses, which, in the future, can be sent direct from the industry to Clearing, at a single switching expense of 50 cents per ton, instead of the present $1 per ton absorption charge paid by the receiving roads (exclusive of the switching expense). A total of 2,306 tons are daily sent by universal houses to the railroads, at an expense of $2,306 plus switching. It is estimated that at least 1,500 tons now passing over universal platforms could be switched direct to Clearing at a saving of 50 cents per ton, which is the difference between the $1 absorption charge paid to universal houses and the 50 cents switching cost from the industry siding to the clearing house.)

6. A saving of 40 hours of switching crews' time, at $5 per hour or $200. (Cars from universal stations are switched to the various roads in many switching movements; under a co-operative clearing plan, there would be but one switching movement. To illustrate, Sears station now loads out 70 trap cars each day, which the B. & O. C. T. moves to junctions from which each of the 23 roads is obliged to switch to

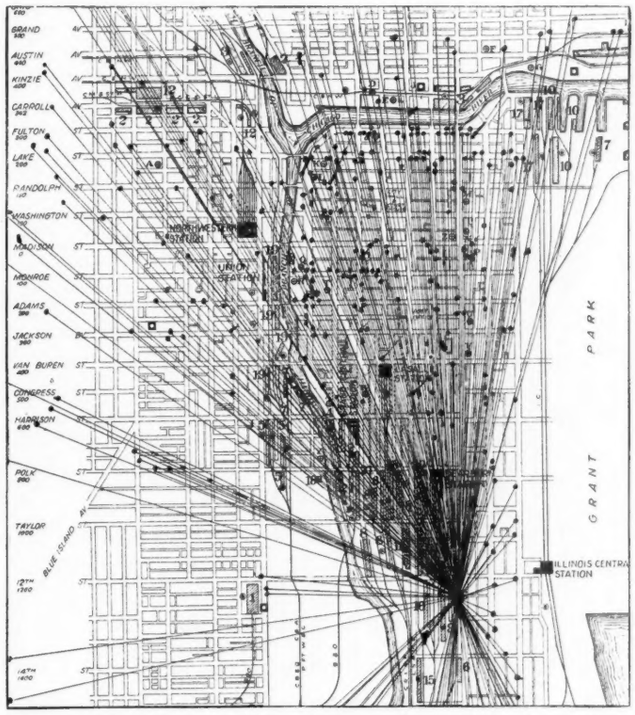


Fig. 5.—Map Showing the Origin of 326 Shipments Weighing 151 Tons Delivered to the A. T. & S. F. Freight House by Teams in One Day

its own terminal. Under the clearing plan, two movements in solid trains would accomplish the same deliveries. A saving of at least 20 crews, requiring two hours each day, and equalling 40 hours, would be made by all the roads, if one clearing delivery point is accepted.)

7. A saving of 40 cents per ton on 764 tons of outbound freight, originating at industries or $305.60. (Cars can be loaded to several roads, but, if possible, full cars should be loaded to single roads. At present, the 764 tons originating at industry sidings is switched to the 23 trunk lines in many complicated switching movements, averaging probably 75 cents per ton expense, which, added to the outbound platform labor cost of 45 cents, equals $1.20 per ton. Under the clearing plan, these complicated movements would be eliminated by single movements to Clearing, costing not over 50 cents per ton, which, with the labor expense of 30 cents at Clearing, amounts to 80 cents, a net saving of 40 cents per ton in favor of the clearing plan.)

8. A saving of 45 cents per ton on 438 tons of transfer

freight received from and delivered to boat lines or $197.10. (This class of freight is now usually delivered by the boat lines to their private docks and transferred by team to the several connecting railroads, at a teaming expense of 80 cents per ton, which is paid by the receiving road. Under the clearing plan, this class of freight will arrive at the private docks or the municipal pier, be loaded into dray cars, and switched to Clearing, where it will be loaded to destination. The saving effected will be the difference between 80 cents drayage plus 45 cents labor, or a total expense of $1.25 per ton, under the present plans, and 50 cents switching plus 30 cents labor expense, a total of 80 cents, under the clearing plan, a saving of 45 cents per ton in favor of Clearing.)

9. A saving of 15 cents per ton on 650 tons of outbound freight received at sub-stations out on the line and switched to Clearing, instead of to the terminal down-town house, or $97.50. (Several roads maintain sub or extra stations for outbound freight, which is brought by switch cars to the terminal outbound house, or to a transfer house, for reload-

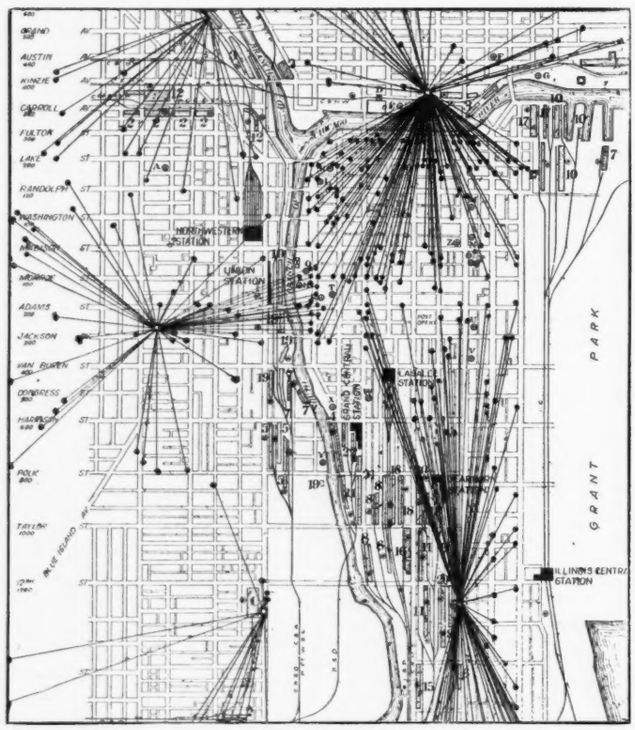


Fig. 6.—Map Showing the Relief Which Would be Effected by Delivering the 326 Shipments to 5 Universal Houses for Movement to Clearing for Reloading into Cars for Destination

ing to destination. This class of freight can be forwarded to Clearing, to be distributed and loaded into cars in station order for 30 cents per ton, while at the down-town terminal or the outbound transfer house, it will cost 45 cents, a net saving of 15 cents per ton, assuming that switching expense is the same to either station.)

10. A saving of 15 cents per ton on 284 tons of freight originating on the river, or $42.60. (This class of freight should be delivered to one combined reloading station and dock, for the use of tunnel and river business, where it is reloaded into dray cars and switched to Clearing in one movement, instead of 20, as is now done. A more extended use of the river will reduce the traffic congestion on the down-town streets, and reduce the number of teams now requiring space at the freight house doors. There is an extra switching expense of 50 cents per ton for delivery to Clearing, to which such roads as own their own docks are not now subjected to, but when the interest charge for capital invested in the dock is considered, it puts the owner and non-owner of the pier on an equality, so far as the switching cost per ton is concerned. The present expense is $1 absorption, 50 cents for switching to the freight house, and 45 cents for loading to destination, a total of $1.95. Under plan B, there would be $1 absorption, 50 cents switching, and 30 cents labor at Clearing—total $1.80—a saving of 15 cents in favor of Clearing.)

To offset the savings, there should be deducted the following items:

11. A loss of 60 cents per ton on 872 tons, originating at the tunnel universal stations, or $523.20. (Under plan B, this tonnage would be carried to one reloading station, loaded solidly into dray cars, and switched to Clearing. The expense would be $1 absorption, 25 cents labor handling, 50 cents switching and a final distribution cost at Clearing of 30 cents, totaling $2.05. The present expense is $1 absorption and 45 cents labor expense, a total of $1.45, leaving 60 cents extra expense against Clearing.)

12. A loss of 60 cents per ton on 538 tons, originating at private tunnel connections, or $322.80. (Under plan B, this tonnage will be carried to one reloading station, loaded solidly into dray cars and switched to Clearing. The absorption is 80 cents per ton; switching to Clearing, 50 cents; labor handling at the single unit down-town station, 25 cents; and final distribution at Clearing, 30 cents, a total of $1.85. Under the present plan, the expense is 80 cents absorption and 45 cents for labor at down-town houses, or $1.25, leaving a difference of 60 cents per ton against Clearing.)

The apparent expense on tunnel business is equalized: (1) by the fact that, if the roads maintained freight houses in the loop, where property values are from $20 to $50 per sq. ft., it would mean an overhead charge of from 60 cents to $1.50 per ton; (2) these tunnel stations relieve each freight house from team congestion, and (3) each freight house has more platform space at its disposal.

Under plan B, there will be an added expense of 60 cents per ton on 880 tons of outbound l. c. l. freight, originating down-town, or $528. (Of the 16,130 tons that departs from Chicago daily, 4,400 tons originate in Chicago and is delivered by dray to outbound houses, representing about 25 per cent of the total outbound business. It is estimated that less than 20 per cent of the outbound freight will be loaded and forwarded from down-town houses, to be reloaded at Clearing. The present cost of schedule loading from dray to schedule car on down-town platforms is 45 cents per ton. This same class of freight, under plan B, would meet with 25 cents loading expense, 50 cents switching and 30 cents for schedule loading at Clearing, or a total of $1.05, leaving an excess expense of 60 cents against Clearing.)

Under plan B, operated as a clearing house for outbound schedule loading of freight originating in Chicago, together with the transfer freight received from out of town points, there will be a total daily saving of $8,109.70, from which must be deducted $1,374 additional expenses, leaving a daily net saving of $6,735.70, or $2,088,067 annually for 310 working days.

Under plan A, operated as a transfer house, which includes only transfer loading to connecting roads at Clearing, in which each road will do final schedule loading at its own outbound house, there will be:

(1) A saving of 45 cents per ton on 2,195 tons, or $987.75. (Freight transferred by team or tunnel meets with a labor cost of 45 cents per ton at the inbound house, 80 cents per ton expense for transferring by team or tunnel, and 45 cents per ton platform expense, for reloading to destination at the outbound house, a total of $1.70 per ton. This class of freight transferred through the clearing house would meet with a handling cost of 30 cents and a switching expense of 50 cents from the clearing house to the road's out-

bound house, where it receives final distribution, at a labor cost of 45 cents, or a total of $1.25 per ton, a saving of 45 cents per ton in favor of clearing plan A.)

(2) A saving of 15 cents per ton on 3,034 tons, or $455.10. (Freight transferred by switch car meets with a labor cost of 45 cents at the transfer or inbound house, 50 cents per ton for transfer switching, and 45 cents per ton for final distribution at the outbound house, a total of $1.40 per ton. This class of freight, if handled at the clearing house under plan A, would be separated to connecting roads at a labor cost of 30 cents per ton, a switching expense of 50 cents per ton from the clearing house to the road's outbound house, where it receives final distribution, at a labor cost of 45 cents, or a total of $1.25 per ton, a saving of 15 cents per ton in favor of clearing plan A.)

Under plan A, there will be a total saving of $1,442.85 each day, or $447,283.50 annually, for 310 working days.

Comparison between plans A and B:

Daily saving under plan A.....	$1,442.85
Daily saving under plan B.....	6,735.70

Union Freight Houses

Chicago's population of 2,500,000 in 1915 is increasing at the rate of 2 per cent. per annum compounded. The package freight business is increasing at about 4 per cent per annum. As the Clearing idea is developed and improved, it will be found the nucleus of a great co-operative scheme for giving Chicago even better l. c. l. freight facilities than it now enjoys.

In connection with the central clearing house, there should be established at convenient places all over the city, and especially at the outer boundaries of the loop district, wherever trackage facilities are available, a number of in and outbound "union" freight houses, that will receive freight to be forwarded on any road, or deliver freight coming from any road. These union stations, if intelligently located, should divert the traffic away from the present down-town freight houses.

Each union station should be given an arbitrary number, beginning with No. 1 for the main down-town freight house, and numbering each station outwardly and consecutively, as for example, I. C. (1), I. C. (2), N. W. (1), N. W. (2), etc. Each shipper will then deliver his outbound shipments at the freight house nearest his place of business. On his inbound shipments, he must order his goods via any road, to be delivered to the I. C. freight house No. 3, Chicago, or N. W. No. 4, etc. These shipments will all pass through the clearing house and be treated as transfer shipments, going to connecting lines, inbound or outbound.

Figs. 5 and 6 illustrate graphically the beneficial influence upon street traffic to be gained by the establishment of union freight houses. Each dot represents the origin of a team and a shipment, from which a line has been drawn toward the freight house to which the shipment was destined. It can be seen how many team trips are made directly through the congested district.

Fig. 5 shows the traffic going to one freight house, while Fig. 6 is the remedy, showing how five union houses, established just outside of the congested area, will divert the team traffic away from the business district. Maps made by the writer for every freight house in the city show that the union freight house would be a great factor in diverting the down-town team traffic away from instead of through the congested district.

In 1912, the writer began the agitation for union houses for both in and outbound l. c. l. freight. The Arnold report on the rearrangement and development of steam roads, dated November 18, 1913, and The Chicago Railway Terminal Commission report of March 29, 1915, recommend their establishment. The writer believes it will be practical to do this only on condition that the clearing or interchange houses are first in operation.

Since the union freight houses will greatly decrease the hauling distances, and thus be a direct benefit to the shippers, there should be fixed a service charge to be paid by the shipper for this convenience.

At these union houses, there should be a platform, say 25 ft. wide, for the use of teams. There should be two or more strings of cars placed on the opposite side of the platform alloted to roads included in the clearing group. Teams should be required to back up nearest the dray or trap car, in which the shipment is to be loaded, and as all trucking is thus confined to the short distance across the platform, this expense should not exceed 25 cents per ton. The switching expense to the clearing house will be about 50 cents, and the final handling at the clearing house will be 30 cents, or a total of $1.05 cents per ton.

Conclusions

In the establishment of a central clearing freight house, it is confidently believed:

1. That the duplication of schedule cars on roads that now maintain outside or duplicate transfer houses can be avoided.

2. That more set-out cars can be loaded to junction, transfer and set-out points, thus reducing the number of peddler cars.

3. That good tonnage can be obtained in peddler cars for a smaller number of stations.

4. That the minimum number of cars will be hauled and that the maximum present day loading of 5.7 tons per car will be greatly exceeded.

5. That level loading on 4-wheeled trailers and mechanical transportation by tractors will reduce accidents and damage to freight.

6. That heavier and more compact loading into cars will reduce the damage to merchandise while in transit.

7. That per diem expenses for the use of cars will be much less because of the prompt unloading of cars, and the elimination of delay in switching movements, now occurring at the city freight houses.

8. That the movement of freight upon a platform in one steady onward channel is more economical and will cause less damage to merchandise than the complicated and interfering routes now taken by the men operating two-wheeled hand trucks.

9. That ample room upon the 70 ft. by 1,300 ft. platform will give the stowers a good opportunity to accumulate merchandise, so it can be selected and loaded in cars in station order.

10. That the present inbound and outbound city freight houses will have ample room to carry on exclusive city business if the interchange freight is handled at an out of town clearing house.

11. That the removal of the transfer business from the down-town district will liberate track room that will allow for future expansion. (The interest on the investment in land for track room in the down-town district now amounts to from 50 cents to $1 per ton for each ton handled.)

12. That industry trap cars transported to a clearing house in solid trains will cost much less than delivery to widely separated down-town freight stations, as under the present practice.

13. That impartial management will insure prompt movement of all cars homeward and with a maximum load.

14. That by reason of the absence of interference by the public, the clearing transfer station can be operated day and night, so all cars will leave before 9 P. M. the day of receipt.

15. That the expense of supervision, stationery, fuel, lights and maintenance is much less at a combined freight clearing house than when distributed among numerous individual interchange freight houses, now numbering 55 and located in the down-town district.

16. That speaking tubes, telephones, pneumatic tubes,

electric signaling and labor saving devices can be advantageously installed, to reduce operating expense.

17. That it will divert to Clearing, outside the city 630 switch cars, carrying 3,744 tons of transfer freight now hauled between in and outbound houses within the city.

18. That it will take off the city streets 2,000 tons of teaming each day, represented by 2,500 wagons, making a line 14 miles long.

19. That the taking off the streets at the inbound and outbound houses of the teams now hauling interchange or beyond Chicago freight, will give ample room for those teams engaged in hauling merchandise for the merchants and industries to and from the city freight houses.

20. That a clearing house will increase the amount of freight handled, both inbound and outbound, via the river and the tunnel, and decrease the hauling through down-town streets.

21. That as the city grows, we must utilize the tunnel to a greater extent. About 1,100 tons of outbound and only 100 tons of inbound freight is now handled per day. The clearing plan will make the tunnel a greater vehicle of exchange between shipper and railroad.

CONNECTICUT REPORT ON MILFORD COLLISION

The rear collision of passenger trains on the New York, New Haven & Hartford, near Milford, Conn., on February 22, which was the subject of a report by the Interstate Commerce Commission (summarized in the *Railway Age Gazette* of April 7, page 792), was also investigated by the Public Utilities Commission of Connecticut, and the report of that body has just been issued. C. C. Elwell, a member of the commission, sat with Mr. Belnap, inspector for the Interstate Commerce Commission, in the investigation, but the document now issued is made up largely of the report of John F. Trumbull, chief engineer of the Connecticut commission. From this report we note a few facts not given in the previous account.

The cylinder saddles and smoke-box of the engine of No. 5 were found lodged in the interior of the rear car of train 79, about 25 feet from the rear end. Train 79, at the moment that it was struck, was held by its maximum emergency braking power, and the engineer concludes that "in view of the tremendous force of the blow delivered by train No. 5, the cars withstood the shock well." The hole in the boiler of the wrecked engine was in the inside of the firebox; cause not given. The escape of steam from this rupture gave rise to reports that the boiler had exploded. Mention is made of the fact that the heavy iron casting on the end of the steam heat hose between the engine and first car of No. 79 may have caused the rupture of the air brake hose which led to the stoppage of the train; but no opinion is expressed as to whether that thing did actually occur. The engineman and fireman of No. 79 were on the ground, changing the air hose, at the time of the collision; but in response to a shouted warning, they caught hold of the car and were dragged along the track, thus escaping almost certain death.

The New Haven wrecker was called at 11:40 a. m. (about 19 minutes after the collision); departed at 12:25 p. m., and arrived at the scene of the accident, about 7 miles away, at 1:50 p. m. The wrecker from Harlem river, called at the same time, arrived at 3:05 p. m. The two eastbound tracks were cleared at 4:18 p. m., and the two westbound at 9:32 p. m.

The semaphore signals are fixed below the horizontal members of the catenary bridges, not above.

Speaking of the presence of the third man in the cab of the locomotive of No. 5, the engineer says: "It should not necessarily be assumed that his presence was a contributing cause of the wreck." The engineer makes four recommendations:

1. More rigid enforcement of the railroad company's rule forbidding unauthorized persons to ride on locomotives; although the violation of this rule, discovered in the investigation of the accident, may not have been a contributing cause.

2. A more efficient organization for handling wrecks and for relief work, to ensure proper care of the injured and quicker clearing of tracks for the resumption of traffic. This suggestion cannot properly be classed among those which, if carried out, would assist in avoiding similar accidents, but the confusion attending the care of the injured from a wreck occurring between two large cities only 17 miles apart, as well as the long delay in clearing practically undamaged tracks for normal service, would seem to be unwarranted.

3. A rule requiring all trains to be brought under control before passing block signals indicating caution and to be maintained in that condition until the next block signal indication in advance is seen and obeyed. . . . I believe a definite and immediate act of obedience is just as necessary at a caution signal as it is at a home signal. If complied with, it should not fail to keep in the engineer's mind the important fact that his train is under control on account of a possible stop signal ahead and cannot, under the rules, resume speed until assurance of clear track is received at the next signal.

4. A more active effort on the part of the New York, New Haven & Hartford to develop and perfect an automatic train stopping device that will operate successfully on its electrified system. . . .

In connection with the fourth recommendation attention is called to the order of the commission in the case of the derailment at Westport, October 3, 1912, calling for the adoption of approved mechanical devices, because of the impossibility of overcoming entirely human frailty; and declaring that there is "apparently no insuperable obstacle that prohibits the development of a device suitable for use on the electrified section of the road."

The commission, adopting Engineer Trumbull's conclusions, and referring to four well-known previous disasters from overrunning signals, says that "these acts were not wilful, but were incident to universal human frailty. The disastrous results of such acts cannot be entirely prevented by the substitution or addition of other human elements. We call attention to and lay particular stress upon the suggestion of our engineer pertaining to automatic train control devices. We feel that this matter has not been given the careful constructive study and experimentation on the part of the railroad company that the necessities warrant, in fact, demand."

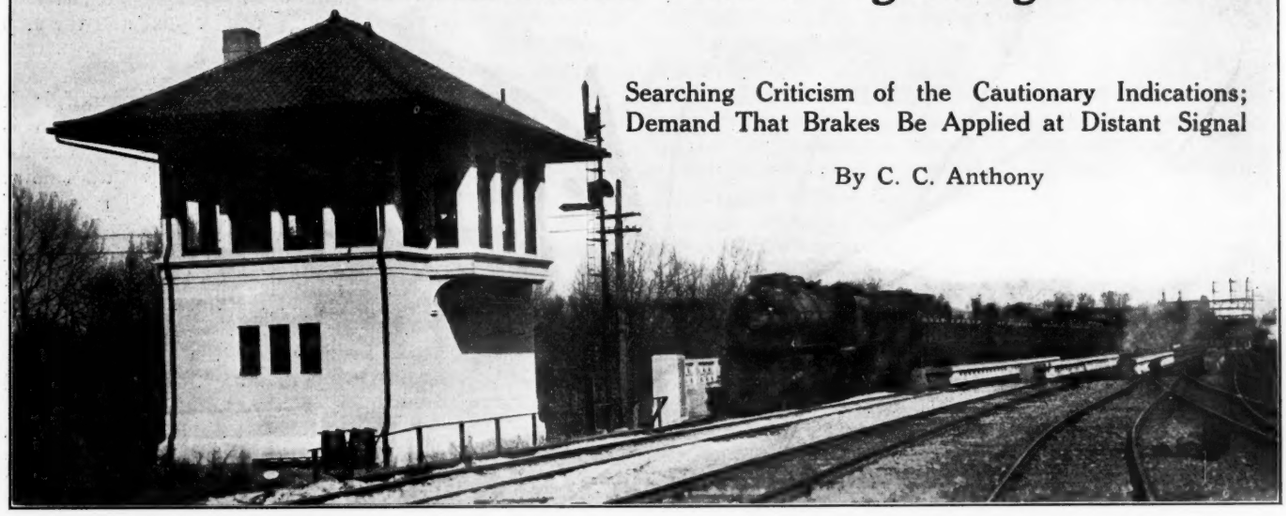
Referring to the short time interval between the trains on leaving New Haven, and discussing the question of flag protection, the commission says: "Hand signals are not as reliable as fixed signals, and on four-track railroads are likely to be confused with those intended for other trains. . . . Had the trains left New Haven ten minutes or even twenty minutes apart, and had the speed of the leading train been reduced . . . the collision would have resulted, under the same circumstances."

In the congested suburban territory around the large cities "trains must be run close together in order to handle the traffic. . . . The commission does not deem it advisable, for the reasons stated, to recommend any arbitrary rule governing the spacing or time interval between trains. While the necessities of dense traffic require the close spacing of trains, the safety of the traveling public should be safeguarded to the fullest extent."

This report is signed by all the members of the commission, Richard T. Higgins, J. H. Hale, and C. C. Elwell.

GIRLS AS ENGINE CLEANERS IN ENGLAND.—The London & North-Western Railway is engaging girls as engine cleaners at its sheds (engine-houses) at Crewe.

The Revised Standard Code: Signaling Rules*



Searching Criticism of the Cautionary Indications; Demand That Brakes Be Applied at Distant Signal

By C. C. Anthony

Caution Indications

FOR the one indication of the earlier schemes, "Proceed with caution," the codes have three: "Proceed with caution prepared to stop short of train or obstruction," the manual-block permissive indication, Rule 301 G: "Approach home signal with caution," one of the block and interlocking distant-signal indications; "Approach next signal prepared to stop," the indication given by a three-position automatic-block or interlocking signal, for the main route, when the next signal requires a stop or a movement at comparatively low speed.

For the manual block signal the familiar indication, "Proceed with caution," had stood unchanged in the code nearly twenty years and was in common use long before that section of the codes was adopted; it was short, simple and well understood. Why, at this late day, it was thought necessary to lug into a signal indication a part of the things that an engineman should look out for, or be "prepared to stop short of," when proceeding with caution, is not easy to understand. Possibly, however, it is because the engineman is elsewhere told to be prepared to stop at next signal and it seemed necessary to tell him just what to be prepared to stop short of in this case, so that he should not overburden himself by looking out for, or fall into the error of being prepared to stop at, a signal that might not be there. For, indeed, the whole theory underlying these new indications seems to be that an engineman should be told as specifically as possible just what to look out for or to be prepared to stop at, so that he may studiously avoid looking for anything else! Or it may have been felt that the simple injunction, "proceed with caution," was not intelligible and needed explanation. But if that is the case here, then the next indication, "Approach home signal with caution," is sadly lacking in definiteness.

The two indications, "Approach home signal with caution" and "Approach next signal prepared to stop," are a good deal alike in form, seem to go with very similar conditions and seem to require much the same action. Now, supposing that they are unlike in all of these particulars, the only difference of any importance must be in the last; for the test and the sole reason for existence of a signal indication governing the movement of trains, is the action required of the engineman. If there is any difference in this respect, it is a very subtle and elusive one. It is hard to believe that enginemen take materially, if any, different action in response to the signals shown with one of these indications from that which they take for those shown with the other; or that there is any reason why they should. Possibly the difference is so subtle that the framers of the indications were unable to make it clear to themselves; and perhaps that is the reason for not adding to the second indication some explanation of the phrase, "with caution," in spite of the fact that one was supplied for the "permissive" signal. Whatever the reason, however, it would seem that there are believed to be at least two varieties of caution.

In a search for light on the difference between the two indications, it may be learned from the side columns that the one, "Approach home signal with caution," is given when the "home signal is not clear" and when the "block is not clear or track is obstructed between distant and home signals"—this last in the case of automatic distant block signals; and that the other, "Approach next signal prepared to stop," is given when the "block is clear; second block in advance is not clear" (automatic signals and semi-automatic interlocking signals) and when the "route is set; next signal is not clear" (non-automatic interlocking signals). The difference, then, may be based on the fact that, in the one case, the track between one signal and the next is obstructed, or its condition is unknown, while, in the other, the track—or block—is clear. It would seem, however, that the non-automatic interlocking signal is in the same class with the distant signals; nothing is said about the block and there may be as much uncertainty as to the block or track conditions in one case as in the other. Nevertheless the non-automatic gives the same indication as the semi-automatic signal.

Coming back now to the engineman's action: the information quoted above is not intended for him; and, as previously remarked, it is well that it is not. But even supposing that he had this knowledge, it still remains to be shown that he would or should take any different action in one case from that which he takes in the other. Until this is shown—and the possibility is doubted—there is no justification for the two indications; on the contrary, they merely tend to befog the situation.

Action Under a Caution Indication

The original indication, "Proceed with caution," requires that the train be so run that it can be stopped within range of vision—short of a stop signal, a train ahead, or any visible obstruction. Now, if a train not previously restricted comes to a caution signal, it cannot usually be running in

*This is the third and final article in the series by Mr. Anthony, assistant signal engineer, Pennsylvania Railroad. Previous articles were printed March 17, page 471, and April 7, page 781.

the manner specified, at the moment when it passes the signal. Any necessary action must be taken, however, to bring the train to that kind of running with reasonable promptness—in a greater or less distance, depending upon the original speed of the train and the character of the road beyond the signal. This is the ordinary case when a train reaches a distant signal at caution or an automatic-block signal at caution if the preceding signal was clear. If, then, occasion for stopping is found at sufficient distance from the caution signal to permit a service stop, the required stop can and should be made as a matter of course. Again this is an ordinary case, when a stop signal is at ample distance from the caution signal in its rear. Mechanical distant signals, of course, are frequently not at ample distance from their home signals because the distance is limited to that at which satisfactory operation of the signal is possible. This exception, however, presents no serious difficulty. The locations of signals are fixed and enginemen must know the road. The engineman of a fast train, then, knowing that a certain signal is at less than stopping distance from a signal beyond (which may be at stop), must approach the first signal at reduced speed unless he can see it at "proceed" before it is necessary to act.

If a train is already proceeding with caution when it approaches a caution signal, as it may be on account of a previous caution indication, it can and should continue to proceed with caution at and from that signal. This should evidently be the case in permissive manual blocking when the home signal is at caution on account of the block ahead being occupied, and the distant signal is also at caution—and equally where there is no distant signal, because, in that case, trains must always approach the home signal with caution. A train approaching under such circumstances should be able to stop short of the preceding train at any point beyond the home signal. If, on the other hand, the signals are so controlled or operated that the distant is clear with the home at caution when the train occupying the block is at ample distance beyond the home signal, a following train may reach the home signal without restriction and the action required is exactly the same as that described above in connection with a distant or automatic-block signal at caution; the train should be proceeding with caution and able to stop before it comes up with the train ahead. The only points of difference in this case from that of the distant or automatic signal at caution, are that the train may have to continue with caution for several miles and that there is no one definite place (the location of a "next signal") at which the necessity for a stop may be expected to exist.

Now, much of the objection to the codes of signal rules, voiced at the session of the Association in November and supported by the respectable vote of 21 opposed to adoption, against 72 in favor, was directed at the subdivision of what is regarded as a single caution indication, into specific permissive, caution, approach and "prepare-to" indications, and this objection was evidently based on the interpretation of the caution indication set forth above. Under this interpretation, it is contended, the same action is required by all of the various indications referred to, and there is, therefore, no occasion for these differently worded indications. To get to the bottom of the matter it is necessary to seek the point of view from which it seems to be necessary to substitute several specific indications for "Proceed with caution."

Caution vs. Specific Indications

Among the reasons for the specific indications are understood to be:

In the case of automatic or semi-automatic signals, when one signal gives the "approach" indication because the next signal is at stop, the block, or track, up to the next signal must be clear. To "approach next signal prepared to stop" is, then, exactly what is required and all that is required. There is no occasion to give a caution indication if that indication requires an early reduction of speed and the slow running of many of the trains over, perhaps, the last half of the distance between the "approach" signal and the stop signal.

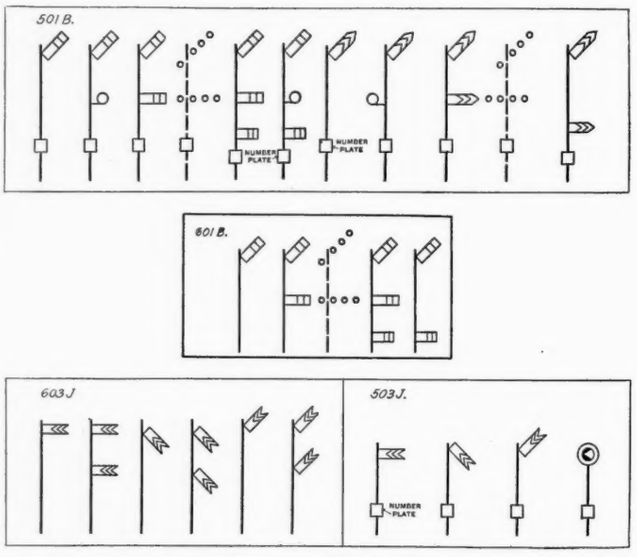
Under these circumstances:

1. The caution indication is positively untruthful; it suggests conditions that do not exist. The engineman is unfairly treated if he is arbitrarily required to look out for obstructions that he never finds, and to bring his train down to a speed from which it can be stopped within range of vision—then running it in that way to the next signal, when in fact the known location of the next signal is the first point at which it can be necessary to stop. The signal should, then, tell the truth—that the track is clear; or, at least, it should not imply the contrary.

2. The engineman, learning how the signals are controlled and therefore knowing that the track is clear, will not take the action required by the caution indication, but will merely prepare to stop at the next signal. He may thus form a habit that will result in careless running when some signal is at caution because there is a "train or obstruction" at an unknown point ahead.

3. The action required by the caution indication, when the track is clear, results in unnecessary delay. No chance of not being able to stop at the next signal should be taken, but, short of taking such chance, the train should reach the next signal (or a point from which it can be seen) with the minimum necessary reduction of speed. Then, if the signal is found to be clear, the train has suffered the least possible delay.

4. If the next signal is found to be at caution and the train is required to proceed with caution "at and from that signal"—through the whole block beyond, the delay is altogether beyond reason. As that block is surely clear, the train should be free to increase its speed so long as it is



Standard Code Signal Aspects; Rules 501B; 601B; 603J; 503J.

501 B.—Indication, Approach next signal prepared to stop. Name, Approach-signal. Requisites of Installation: "Signal will appear when block is clear; second block in advance is not clear."

503 J.—Indication, Approach home signal with caution. Name, Caution-signal. Requisites of Installation: "Signal will appear when block is not clear, or track is obstructed between distant and home signals."

601 B.—Indication, Approach next signal prepared to stop. Name, Approach-signal. Requisites of Installation: For semi-automatic signals, "Signal will appear when block is clear; second block in advance is not clear." For non-automatic signals, "Signal will appear when route is set; next signal is not clear."

603 J.—Indication, Approach home signal with caution. Name, Caution-signal. Requisites of Installation: "Signal will appear when home signal is not clear."

again prepared to stop when it approaches the third signal.

The first two reasons doubtless have considerable weight in the minds of those who assume that it is and always will be difficult to make an engineman do what a signal tells him to do, unless he frequently finds that conditions really require the action indicated. It would seem, however, that it is no more unreasonable to require trains to proceed with caution in the cases under consideration, and that it should be no more difficult to enforce the requirement, than it is to enforce stops at automatic block signals. It is safe to say that many enginemen think these stops entirely useless when the view is unobstructed, and believe that they could save time without lessening safety by passing the stop signals at moderate speed without stopping. Nevertheless, the roads seem to have been successful in convincing the enginemen that a stop signal means stop, no matter how needless the stop may appear.

The third and fourth reasons—avoidance of delays—would have much force if they were not subject to exceptions and if safety were not involved. When the next signal clears before the train reaches it, a fraction of a minute is, of course, saved by the kind of movement that brings the train to, or in sight of, that signal as soon as possible. The same thing is true when an automatic ("stop-and-proceed") signal is out of order; it is of advantage for the train to lose no more time than is necessarily taken by the stop and the movement with caution through the next block. On the other hand, when the next signal clears a little later, it is generally much better for the train to slacken promptly after passing the "approach" signal, so as to avoid a stop by allowing time for the signal to clear. This is especially true when one train has to follow another through several automatic blocks at fairly high speed; it is unquestionably best for the second train to fall back as soon as it finds a signal against it, so as to get the succeeding signals clear. That is, action in accordance with the caution indication at two or more successive signals, is in reality just what is generally needed to increase the space between trains that are getting too close together. The resulting delay is due to the conditions existing, and not to the particular signal indication. Thus it appears that, in only part of the cases in practice, can the freedom given by the "approach" indication be turned to advantage in saving delay.

Coming now to the question of safety: In the first place, the indication, "Approach next signal prepared to stop," seems to suggest, if not encourage, the practice of continuing at speed part way from the "approach" to the next signal and then making a stop (if the next signal remains at stop) in little more than the minimum distance under service braking. It is doubtful if this practice is consistent with the highest degree of safety; there is always the chance of miscalculating and so overrunning a stop signal. The fine calculation necessary in making station stops, where overrunning can do no harm, is neither necessary nor wise in the case of signals.

In the second place, there may be a less or greater chance of a stop signal being disregarded, accordingly as the preceding caution or "approach" signal is acted upon immediately, or not until some time after it has been passed. For, assume that an engineman has passed a signal that he observed at caution as he approached it, that he has done nothing in the way of preparation to stop or reduce speed, because the next signal is at more than sufficient distance for stopping; and that he has previously passed several clear signals. Then the fact that his train is proceeding unchecked—just as it was after passing each clear signal, must strongly suggest that this last signal was also clear. If, on the other hand, the engineman takes some action when he finally notes the caution indication, before passing the signal—closes the throttle or applies the brakes, or does both, according to the circumstances—then the fact that his train is not running just as it was before, suggests that the last signal was not clear. There is reason to believe, then, that the practice of acting upon caution signals after they are passed—merely in good time for a stop at the next signal—does tend toward the forgetting of the caution indications received, and consequent disregard of stop signals. The conviction that habitual prompt action on caution signals would increase the safety of operation, was the basis of some of the opposition to the new indications at the November convention.

It may very well be contended that this is pure speculation; that there is no possibility of telling in how many, if any, cases disregard of signals has come about in this way. Nevertheless, one thing is certain: disregard of signals still occurs too frequently. Efficiency tests and the most elaborate and complete signaling have not eliminated these occurrences. And, as the causes in many cases cannot be certainly determined, other remedies, short of mechanical means, are not easily devised. If, then, there is a reasonable probability that the habitual practice of acting promptly on caution signals, would reduce the number of cases, that practice ought to be prescribed. It may, of course, be argued that the practice here advocated cannot be followed in all cases; for example, in the case of a heavy freight slowly dragging along, with the engine using steam. If the engineman should even close the throttle on arriving at a caution signal, the train would quickly come to a stop. There are, undoubtedly, not a few such cases, in which the engineman would have to use discretion and carry the caution indication in mind while keeping his train moving toward the next signal. It is true, also, that a station or other prearranged stop between signals may make it unnecessary to take action in particular recognition of the caution indication when that indication is received at the signal in the rear of the stopping place. In all such cases, however, the same conditions that compel dependence upon the unaided remembrance of the caution indication, generally cause trains to approach the next signals at moderate speed so that, even if the caution indication is forgotten, a stop signal is not very likely to be overrun. It remains a fact that all of the numerous trains moving at fairly high speed—both passenger and freight—can well be checked promptly at caution signals.

From all of the considerations set forth above, the conclusion is believed to be fully warranted that the general practice should be to take some action toward reducing the speed of the train before a caution signal is passed, and to continue at moderate speed from signal to signal if one or more succeeding signals are found to be at caution. This general practice would produce the best and smoothest train movement by eliminating numerous stops and starts at signals; would, in many cases, cause no avoidable delay, but would rather tend automatically to space trains as they should be spaced for free running; and would increase safety of operation by reducing the number of cases of signals overrun or disregarded. The increased safety would more than offset the small savings of delay that could sometimes be realized from the practice of taking no earlier action on a caution signal than is necessary to make possible a stop at the next signal.

If this conclusion is sound, there is no occasion for the difference between the indication of a distant signal, "Approach home signal with caution" and that of an automatic or semi-automatic signal, "Approach next signal prepared to stop." Moreover, references, in these indications, to the "home signal" or the "next signal" are objectionable because they focus attention on the next signal and continually suggest action only with reference to that signal, rather than immediate action. Presumably a train is approaching

the home signal immediately after it passes the distant signal and the indication, "Approach home signal with caution," is intended to call for exactly the action required by the indication, "Proceed with caution," as previously described. But the reference to the home signal seems to relate the operation of proceeding with caution to that signal, to the exclusion of anything else, and so tends to distract attention from the hand switch that may have been left open between the distant and the home. To an engineman told to proceed with caution it is unnecessary to say anything about the home signal or the next signal; he knows where the next signal is and will look out for it as a matter of course. "Proceed with caution" is, therefore, by far the best wording for the indication of a signal "governing the approach" to a stop signal beyond.

As for the "permissive" signal: the same simple, well-understood indication has been familiar in that connection so long that "the memory of man runneth not to the contrary"; it means all that any more wordy caution indication means and, through universal understanding of those three words, on railroads, it tells what it means. Why it was thought necessary to substitute the long, lumbering sentence, "Proceed with caution prepared to stop short of train or obstruction," is beyond comprehension.

It may still be said in defense of the three indications in question, that there were just as many in the codes before the revision and that two of the old indications, "Proceed with caution to the home (or advance) signal" and "Approach next home signal prepared to stop," were open to the same criticisms as the new indications that have taken their places. Quite true. But it is no merit of the revised codes that they retain bad features of earlier editions; it was fairly to be expected that the revision would remedy obvious defects.

Several other variations of what is, in effect, the caution indication are to be found in the codes. To see whether there are good reasons for any of them, it will be well worth while to bring together here all of the cautionary instructions and indications.

Caution Under Various Disguises

Rules and Cards.

Rule 10. Color Signals. (b)—"Proceed with caution, ——"

Rule 11. After extinguishing a fusee, "proceed with caution prepared to stop short of train or obstruction."

Rule 15. "The explosion of two torpedoes is a signal to reduce speed and look out for a train ahead or obstruction."

Rule 93. ".....trains must move within yard limits prepared to stop unless the main track is seen or known to be clear."

Rule 98. "Trains must approach the end of double track, ...with caution." "Trains using a siding must proceed with caution, expecting to find it occupied by other trains."

Rule D-102. "A train.....notified that a train on the opposite track has parted, must immediately reduce speed and proceed with caution....."

Rule 106. "Trains must use caution in passing a train receiving or discharging passengers....."

Train order B. ".....the following train will run with caution, looking out for the designated train ahead....."

Rule 462. "On single track regular trains receiving Caution Card (Form D) may proceed on their time-table authority expecting to find a train in the block, a broken rail or a switch not properly set."

Rule 509 B. Passing an automatic block signal at stop. "On two or more tracks [proceed] at once at slow speed, expecting to find a train in the block, broken rail, obstruction or switch not properly set."

Caution Card, Form B. "You may proceed with caution. .....Enginemen receiving this card.....may proceed with the train under control prepared to stop short of any obstruction."

Permissive Card, Form C. "Proceed, expecting to find a train in the block between this station and....."

Caution Card, Form D. "You may proceed with caution by Stop-signal, expecting to find a train in the block, broken rail, or switch not properly set."

Signal Indications.

Rule 301 G, etc. "Permissive" signal in manual and controlled-manual blocking. "Proceed with caution prepared to stop short of train or obstruction."

Rule 303 J, etc. Distant signals. "Approach home signal with caution."

Rule 501 B, etc. Certain three-position signals. "Approach next signal prepared to stop."

Rule 501 G. "Permissive" signal in automatic block. "Proceed at slow speed prepared to stop short of train or obstruction."

(Mr. Forman, in commenting on Rule 11, offers still another variation, "run under perfect control," which harmonizes very well with the injunction, "come to a *full* stop.)

Among all the things to be looked out for, expected or prepared for, the only one for specific mention of which there is even a plausible reason, is the broken rail—Rule 462, Rule 509 B and Caution Card, Form D. The general interpretation of the instruction "Proceed with caution," doubtless does not call for such close scrutiny of the rails as would usually be necessary for the discovery of a broken rail, unless a large piece were broken entirely out. Added instructions to expect to find a broken rail, in the case of signals controlled by track circuits, may therefore be excusable. At the same time, it would be interesting to know just how much difference there usually is (or is really expected to be) between the way of handling a train after passing an automatic signal at stop, and the manner of proceeding with caution anywhere else; also, how many enginemen, acting upon this instruction (already in the rules of various roads), have found broken rails that they probably would not have seen if they had been guided by the former code clause "at once with caution." If, however, broken rails should be mentioned at all, it would seem that they should be referred to in connection with movements under stop signals in controlled-manual block on double track, and in connection with Rules 501 G and 601 G; presumably the indications in these two rules are intended to be given when track circuits are opened by broken rails, as well as when they are affected by trains.

With possible exception of the references to broken rails, then, every one of the indications or instructions quoted above means absolutely nothing more or less than Proceed with caution. The same thing, of course, is true of the "prepared-to" portions of the speed indications—Rule 601 D, "Proceed at restricted speed prepared to stop at next signal," and Rule 601 G, "Proceed at slow speed prepared to stop." As previously pointed out, the earlier indications, "Proceed with caution on medium-speed route" and "Proceed with caution on low-speed route," express the requirements much better.

In these recitals of things that an engineman should look out for, or expect to find, or be prepared to stop short of, there are some variations of language that seem to have no purpose; one is forced to the conclusion that they are accidental. But aside from these seemingly purposeless variations, the whole array marks a persistent tendency to go into minute and useless details in these matters—a practice that is encouraged by the overlooking of one important fact; namely that, when certain things are definitely specified, other things are, by implication, excluded. That these varying detailed instructions do not result in any serious confusion or misunderstanding is undoubtedly due to the good

sense of the enginemen themselves, who rightly take them all to mean Proceed with caution.

One bad effect of too specific instructions and signal indications is to create a demand for more and more of the same kind. As the narrow application of, and the things that are omitted from, a given indication come to be realized, there is a natural fear that the particular indication may not safely cover certain conditions; then a new or more specific indication has to be invented. For example, "Proceed prepared to stop at next signal" has been a familiar distant-signal indication. This wording is specific as to the next signal—suggesting the next full-sized semaphore and no occasion to stop short of that point. When somebody discovers that there may be a hand switch between signals and that the same kind of signal may be connected with a hand switch only, an amendment is in order—"Proceed prepared to stop at next signal or switch."

A most illuminating example of the lengths to which specificalness of indications may lead its victims, is found in the fear arising in some people's minds that enginemen may understand the indication, "Approach next signal prepared to stop," to mean that there is stopping distance between the signal so indicating and the next. That is, an engineman finding an automatic-block signal giving that indication and, say 4,000 feet beyond, finding a home interlocking signal giving the same indication, might assume that the next signal should again be about 4,000 feet ahead; whereas in fact it might be at the other end of the interlocking, only 1,000 or 1,500 feet from the home signal. The engineman, then, would pass the home interlocking signal at fairly high speed, planning to be ready for a stop at the end of another 4,000-foot block but not able to stop at the actual location of the next signal. Astonishing as this idea may seem, there is some excuse for it in the habit, believed to have been formed by many enginemen and rather encouraged by an indication that excludes every consideration but the next signal—the habit of passing a second, or any number of "approach" signals at good speed so long as the distance to the next signal is ample. This habit, it is evidently thought, might some time lead an engineman to run at too high speed when the next signal was only a thousand feet ahead.

The fact that such a fear could ever arise, goes far to condemn the whole pernicious scheme of specific indications and the kind of running which it seems intended to encourage. For some of the differences in the signal indications seem clearly to mean differences of action, having for their main purpose to "save seconds safely." In so far as this is true, it may confidently be asserted that they call for fine calculations and hair-splitting distinctions which, to say the least, are undesirable where the safety of trains is concerned. The fact is that the way to avoid loss of time by a train is not to try to take advantage of every slight difference in the conditions that may occasion the display of a restrictive signal—keeping the train going at good speed to the last possible point and then stopping abruptly; the proper way is to have clear track. The time to make time is when the signals are *clear*.

Progress Backward

If the reasoning followed out through this analysis hangs together at all, it is clearly established that the codes of block signal and interlocking rules, in which there was room for improvement, have been made materially worse by a hasty revision put through without opportunity for railroad officers generally to give the innovations deliberate study and to express their views to the committee before the report was presented. What is now needed is reiteration of the stand taken by the committee in 1911* on the three primary or fundamental signal indications—particularly the caution indication, followed by a reconstruction of the codes on lines of the greatest possible clearness and simplicity. In view of the fact that the revised codes, having been adopted, have been heralded as the last word in standard rules and the proper models for the revision of the rules of the individual roads, there is urgent need that the signal and interlocking rules, at least, be recalled for revision in the direction of real improvement—not backward into a maze of more shadowy and impracticable distinctions.

* Proceedings of the Association, May 17, 1911; pp. 415 and 416.

DEFECTS IN RAILWAY REGULATION*

Chambers of commerce and national trade associations are invited to consider the adoption of resolutions upon the question of making railroad regulation more salutary. An opportunity to make influence felt is afforded by the inquiry into this subject now going forward in Congress. Betterment of facilities is laggard. New construction has practically ceased.

Shippers and carriers have co-operated cordially and effectively for larger use of existing equipment and track, but current increase in tonnage has taxed rolling-stock and terminals beyond their capacity. The reasons for these conditions are clear:

Expenses have risen faster than earnings, and no branch of the government performs the function of providing enlarged revenues to meet the higher costs. It is vital to national prosperity and safety that this defect in regulation be corrected.

The country is entitled to adequate mechanism and methods of regulation. Delegates to national party conventions and members of the federal Senate and House are entitled to know what men of affairs think about this question.

The Railway Business Association, at this stage, points out evils rather than defines remedies.

Though deeply interested in the welfare of the railways, because it is upon their purchasing power that our prosperity depends, we have, as manufacturers, avoided the discussion of technical and legal phases except where previously the subject of organized inquiry and general discussion. Representatives of the railways are laying specific recommendations before Congress. The Railway Business Association acts with entire independence of them and speaks only for its own members. We think it is for Congress, with the aid of specialists, to devise the precise provisions of law by which beneficent purposes are sought to be accomplished, and for us, as business men, to give Congress our actual observation and experience. We call attention to a number of evils in the present system of regulation which seem to us to require remedies.

State Against State

The people of each state have suffered injury at the hands of authorities in other states. Compulsory expenses imposed by one state are spread over the revenue collected in other states. Duplication in cost is paid for by one state because other states have divergent regulations. The commerce of a state has been deliberately attacked by other states through discrimination. It was commercial strife between states, with legal discriminations as weapons, that led to the framing of the present federal constitution. Congress has only in part exercised its constitutional power to protect the people of every state against the authorities of other states.

National defense is shorn of transportation efficiency by reason of divided and conflicting regulation of railways. This weakness shows itself in two ways: First, the drain upon railway resources, due to state exactions, has prevented the development of multiple tracks and of terminals best

*From Bulletin No. 18 of the Railway Business Association.

adapted to transformation for military service. Second, state laws and decrees would impede prompt and vigorous action by way of expenditure for extraordinary facilities and adaptation of equipment and service to military needs.

National growth in time of peace has been retarded through weakening of the railroads by conflicting and overlapping jurisdictions. Business in this country is largely interstate. Areas of trade ignore state lines. Railways have been united into systems extending through several or many states. Regulation, on the other hand, breaks up these systems into railway zones which have no commercial significance. Congress has not assumed the promotion of national prosperity through a fully national regulation of railways. Freedom of trade is obstructed by the failure of one state to consider the necessities of industries elsewhere. A manufacturer or a consumer cannot freely extend the territory in which he has the advantage of competition. Duplication and conflict of regulation is enormously costly, and this comes out of all the people of the country, either in rates unnecessarily high or in facilities artificially poor.

Incompatible Functions

Litigants in interstate commerce are exposed to injustice because the Commission has, under the law, the incompatible functions of detective, prosecutor, jury, judge and mechanical expert.

A shipper whom the commission has accused of falsely billing a consignment, or a railway officer who has been under charges of irregular accounting before it, may appear immediately, asking the same tribunal for consideration in connection with some discretionary matter in which his company has a financial interest. Parties also suffer by delays and otherwise, because the commission is overburdened. The commission, under the law, cannot delegate special subjects to individual commissioners with power, but must act as a whole. Testing of safety devices and materials is under the law performed by the commission, although actually by bureaus.

Subordinates are adjudicating cases which, under the law, the commission alone is competent to decide. These subordinates are of greatly inferior official dignity in emolument and tenure, and are not presidential appointees.

It follows that a large part of the business is transacted either by the commission without close knowledge of local or special conditions, or by subordinates occupying positions of much less consideration, prestige, emolument and tenure. The incumbency of these subordinates is not presumptive evidence that they possess the wisdom and experience to perform satisfactorily duties which the law assumes will be performed by men of such calibre as to be available for membership in the commission itself. Their opinions, adopted by an overburdened commission because lack of time and opportunity precludes original research, cannot be expected to command the confidence which attach to the official action of those whom the President appoints to the commission.

Power to Raise Rates

Shippers of one commodity suffer discrimination when another commodity pays less than its share of the total cost of transportation, because the commission, in adjusting rate situations, has no power to order a rate raised.

The law empowers the commission to fix maximum but not minimum rates. The commission can indicate that if a stipulated readjustment is filed this will be sanctioned; but one railroad, party to that tariff, can veto the arrangement by retaining the low rate and getting all the business. Not only individual shippers, but all the shippers served by all the lines concerned, are the victims of this situation, since the commission is unable to order readjustment except through reductions, and this may so impair railway resources as to prevent adequate service.

National industry and agriculture are under the dead weight of a transportation system which cannot grow with the country's needs, because the government protects the individual shipper, but does not protect the individual railroad.

The stagnation of railway development is due to the squeeze between compulsory increase of expenditures and rigidity or reduction of rates. This in turn arises from two defects in the regulatory system: First, that Congress has not assumed control over all phases of railway regulation where state action now affects interstate commerce. Second, that the federal statute contains no rule for the guidance of the commission defining just and reasonable rates as rates which will enable the roads to attract new capital and grow as the country grows. The government, in other words, having left it to private capital to provide rail highways, has never by statute recognized its duty to permit conditions under which private capital could or would perform that function adequately. Correction of these defects in the regulatory system would go far to restore to the railways their ability to aid national prosperity.

If they were regulated with a view to the national welfare, they would have such earnings in periods of large tonnage as would provide them with a surplus fund. This, in years of general depression, would enable them to proceed without apprehension to make additions and betterments. Present regulation now assures the proper use of railway resources. To make improvements when times are dull has several advantages: That is the time to do it at the least cost; operations of this kind offer the least obstruction to traffic, and traffic to them, when tonnage is light; general unemployment can be substantially minimized if, with a slump in general business, the greatest purchasing group can come into the market.

The re-establishment of railway credit and railway purchasing power would be the most effective insurance policy in which the American people could invest for resisting the industrial shock which many think will follow peace and the cessation of munitions manufacture in this country.

HIGH VOLTAGE DIRECT CURRENT FOR MAIN LINE ELECTRIFICATION

In a paper on High Voltage Direct Current Railway Practice in the April proceedings of the American Institute of Electrical Engineers, Clarence Renshaw, of the Westinghouse Electric & Manufacturing Company, states that there has been a tendency, during the last ten years, to use higher voltages than 600 for suburban and steam railroad electrification, and indicates the standard methods of construction that are now being used with such voltages.

Mr. Renshaw shows that the voltage used on direct current railways has been increased from 600 up to 3,000 by gradual steps differing but slightly from each other, such as 1,200, 1,500, 2,400 and 3,000, and points out that unless the ultimate maximum is not chosen at once it will be reached by a similar number of steps such as 3,600, 4,200, etc. He recommends, therefore, that the ultimate maximum direct current voltage be established at once and suggests that the use of 5,000 volts be standardized for this purpose.

Mr. Renshaw gives some recent operating results of over 30,000 miles operation of the 5,000-volt experimental equipment on the Grass Lakes Line of the Michigan United Traction Company. This equipment, the first in the world to operate at this voltage, ran 23,320 miles during the four months of November, December, January and February, or an average of 5,830 miles per month on a schedule which allows only 15 miles per hour. During this period the car operated through the most severe winter weather, including snow, sleet and rain storms, and for a short period, of necessity, ran with two of the commutator covers missing. It is yet a little early to predict entire satisfaction with the operation of this equipment, but it seems evident that the use of 5,000 volts in electric traction is entirely practical. This voltage will permit the distribution and collection of the necessary power for the largest locomotives.

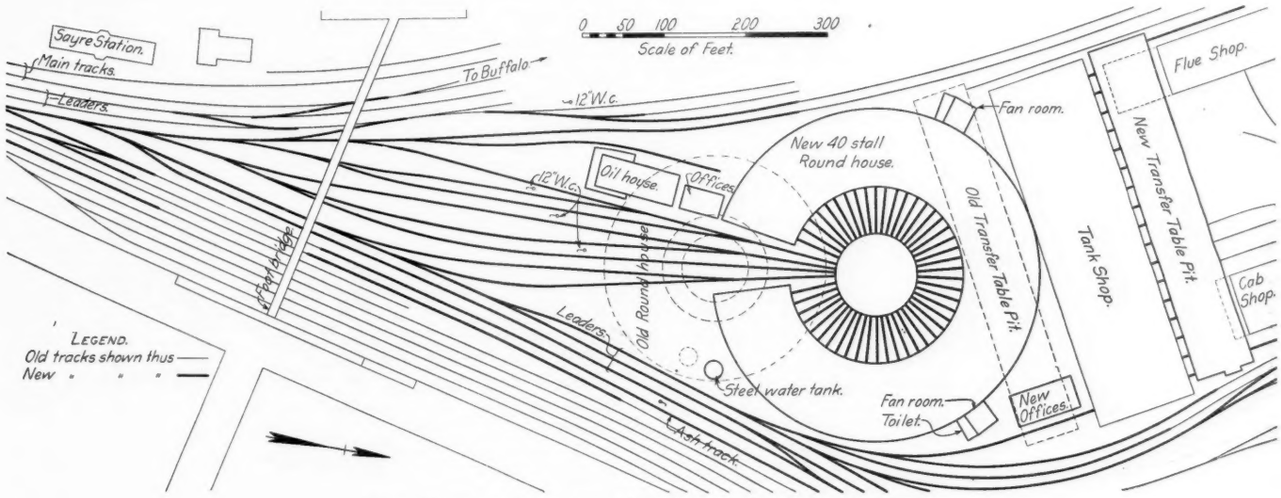
New Lehigh Valley Roundhouse at Sayre, Pa.

A Concrete Structure of 46 Stalls and Auxiliary Facilities Provided to Replace an Inadequate Terminal

The Lehigh Valley has recently completed a 46-stall reinforced concrete roundhouse at Sayre, Pa., to replace an old structure which had proved inadequate. To provide sufficient space for the erection of the new house it was necessary to make certain rearrangements of the shop facilities at that place, which necessitated the construction of a new transfer table for the tank shop, and also a new oil house and a new wheel and axle shop. Extensive rearrangements of the approach tracks and the water service facilities were also made.

The roundhouse contains 46 stalls, 95 ft. deep, and 13 ft. 6 in. wide, center to center of the front door posts. The diameter of the inner circle is 107 ft. Each stall is provided with an engine pit 74 ft. long, 2 ft. 6 in. deep at one end and 3 ft. deep at the other, thus allowing for drainage. Sumps are provided at the low ends of the pits, and are connected to an 8-in. drain which leads to a manhole in the general sewer system. Down spouts from the roof lead into the same system of drains. There is also a pony axle drop pit and a trailer drop pit, each embracing two tracks. These pits are 7 ft. 8 in. deep, by 5 ft. and 6 ft. wide.

The roundhouse is supported on concrete foundations and structural steel posts for the front or door columns and the interior columns, the structural steel being incased in concrete. The rear wall posts are of reinforced concrete, built wide in the form of pilasters. Over the tops of the columns, running radially between each pair of stalls, are reinforced concrete girders, 1 ft. 2 in. wide, varying from 1 ft. 10 in. to 2 ft. 6 in. deep, depending on the span. These girders support slabs of the one-way reinforced concrete-tile type, spanning transversely across the stalls. The thicknesses of these slabs vary from 8 to 12 in. with the increasing length of span from the front to the rear of the house. The roof is waterproofed with Standard Paint Company four-ply built-up roofing flashed with 16-oz. copper flashing. The house is illuminated by windows in the rear wall occupying the entire space between the pilasters above a level about 4 ft. above the floor, and by a clear story, facing the turn table on a line with the first row of interior columns. The rear walls below the windows are 8-in. brick panels built independent of the concrete pilasters, thus preventing any damage to the frame work of the building in case an engine goes through the back



Map Showing Location of New and Old Roundhouses

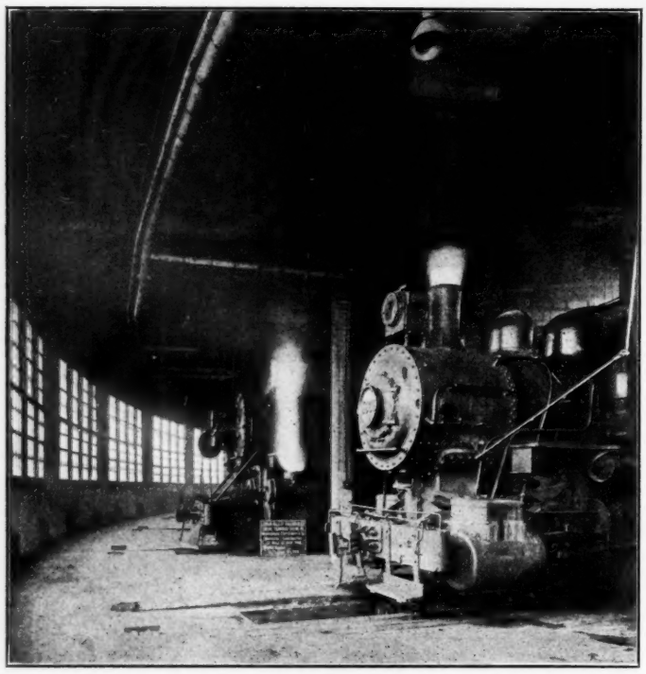
General View of the Inside Circle

wall. The floor is 1½-in. mastic on a 6-in. concrete sub-base.

The building is heated by a hot-air system divided into two separate parts, each controlled by an independent fan layout installed in a separate building built as a lean-to against the outside wall of the main house. The hot air is discharged in the engine pits into which it is led through underground ducts of concrete and title. Dickinson smoke-jacks of the extended opening type are installed. Other auxiliary facilities include electric lighting by means of overhead lamps, with wires carried in conduits laid in the concrete roof, a Miller boiler washing system and the usual steam, air and water piping. The turntable is of the through-girder type, 100 ft. long.

The new roundhouse is located partly on ground vacated by removing the old transfer table for the tank shop. To accomplish this, it was necessary to provide a new transfer table on the opposite side of the tank shop, requiring the removal of sections from the ends of the flue and cab shops. The new transfer table also interfered with the old wheel and axle shop, resulting in a decision to construct a new shop at another site.

The new wheel and axle shop building is 50 ft. by 65 ft. with concrete foundations, brick walls, steel columns, and trusses covered with wood sheathing on wood purlins. The roof is waterproofed the same as the roundhouse. The windows have steel sash with plain glass. A mastic floor is



Interior of the Roundhouse

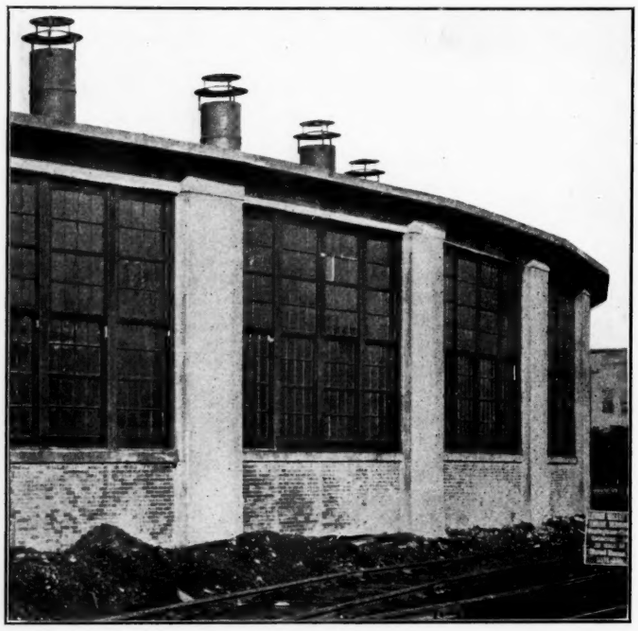
provided. A depressed track has also been built for loading wheels in and out.

Another building included in this same project is an oil house, 40 ft. by 100 ft., which also provides space for an engineers' tool room and locker room. Oil storage is provided for in a basement 40 ft. by 40 ft., which contains a number of tanks, including two of 5,350 gal. capacity, one of 190 gal., and seven having a capacity of 10,000 gal. The building is of reinforced concrete from the basement floor to an elevation four feet above the ground. Above that point the walls are of brick with a reinforced concrete beam and slab roof which is waterproofed the same as the other buildings mentioned. The windows of the oil room have steel sash with wire glass, and the doors are fireproof; the remainder of the building has wooden sash with ordinary glass and has wooden doors.

The oil house is equipped with four Wayne long-distance self-measuring oil pumps. There is also a battery of seven Bowser tanks with Bowser self-measuring pumps. A separate space, isolated by fire proof walls and doors, is provided for the storage of waste, which is handled by means of a monorail.

Construction

The construction of the roundhouse was attended with complications because a large portion of the new house had to be completed before the old house could be abandoned and removed. As seen on the accompanying drawing stalls 1 to



A Portion of the Rear Wall

5 and 41 to 46 occupied space formerly covered by portions of the old house. These stalls were left to the last. Considerable difficulty was experienced in removing the old foundations, which were built of heavy masonry and required extensive blasting. Construction was started on May 18, 1915, the first concrete was poured in the superstructure of the house on August 27, and the first engine entered the new house on October 28. The concrete for the superstructure of 40½ stalls was poured in 33 days, an average of 1.33 bays per day.

The concrete was poured by means of a low tower and spouting furnished by the Insley Manufacturing Company. This tower was mounted on a track on the inner circle of the building and moved around as the building was poured. The concrete materials were brought in on cars running on a track just inside the building and moving along parallel with the tower. This method proved economical and effective.

Westinghouse, Church, Kerr & Co., New York, had a contract for all the new work, which was executed under the general direction of E. B. Ashby, chief engineer of the Lehigh Valley.

Russian Coal.—Russia's production of coal during 1913 amounted to about 31,000,000 tons, and in 1914 to 28,000,000 tons. As the Polish districts, which in 1913 yielded 22 per cent. of the aggregate output, are now occupied by Germany and Austria-Hungary, Russia's production of coal for 1915 cannot be estimated at more than 20,000,000 tons. —*Engineering, London.*

Empty and Load Freight Brake Equipment*

A Discussion of Its Possibilities Compared with the Older Type, with Results of Comparative Tests

By Walter V. Turner
Assistant Manager, Westinghouse Air Brake Company.

Next to the locomotive, the air brake is one of the most important factors in successful railroad operation. If you will consider that the air brake on our passenger trains will do more work in 20 seconds than the locomotive can do in seven minutes, you can appreciate the wonderful assistance that has been given railroad transportation by the air brake.

The transportation and motive power departments of every railroad are greatly concerned with the freight traffic conditions now obtaining on both level and hilly districts. Grades have been reduced and locomotives have been increased in size and power but we still have damaged lading and equipment due to the slack action between empty and

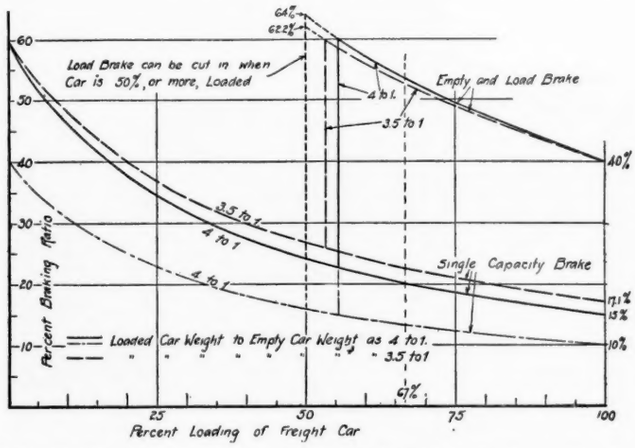


Fig. 1—Chart Showing Braking Ratios for Various Conditions of Freight Car Loading, With and Without Empty and Load Brake

loaded cars. On hilly districts trains are restricted in length, hand brakes are used and empty cars are operated up and down each side of the grade just to bring down the tonnage per brake to an operative point.

Uniform retardation on all cars in the train is the secret of the elimination of slack action. But uniform retardation is impossible in a mixed train made up of empty cars braking at 60 per cent and loaded cars braking at from 15 to 17 per cent. The empty cars must do the braking for their own weight and part of that for the *lading* of the loaded cars. Uniform retardation, until the serial brake action has passed the full length of the train, is, of course, impossible, strictly speaking, without electrical assistance, which is found in the electro-pneumatic brake. But by applying the pneumatic brake cautiously uniform retardation in a practical sense may be had in freight service. It necessitates, however, the use of an "Empty and Load" brake.

An "Empty Car Brake," "Single Cylinder Brake," or, to use perhaps the best name of all, "Single Capacity Brake," is the one most generally found in railroad service today. It is one in which a constant braking force is used for all conditions of car loading and one for which the braking ratio is invariably based on the empty weight of the car. Consider what the range in braking ratio is when the car varies from its empty to its fully loaded weight. Take a car weighing 40,000 lb. empty and braked at 60 per cent of this weight. If the car has a capacity of 110,000 lb. and an overload margin of about 10 per cent, the total loaded weight becomes 160,000 lb. The constant braking force which was 60 per cent of 40,000 lb. is now $\frac{40,000}{160,000}$ of 60 per cent, or 15 per cent of 160,000 lb. It is inevitable that cars braked only one-quarter as effectively as others should close up or pull away, as the case may be, according to the relative positions in the train. That is to say, it is inevitable that slack action—violent slack action—should occur. Some railroads have, in my judgment, foolishly jumped from the frying pan into the fire by increasing the braking ratio on the empty car. This, of course, increases the braking ratio above 15 per cent when the car is loaded, but it is disastrous to braking operations with long trains.

The empty and load brake is one wherein a braking force is used varying with the weight of the car and thereby giving either a constant braking ratio for all conditions of car loading or a ratio much more limited in its variation than in the case of the single capacity car brake. The empty and load brake as designed for freight service has two distinct braking forces due to the operation of one or of two brake cylinders during brake applications. The full service braking force obtained with the one cylinder is 60 per cent of the empty weight of the car, as with the empty car brake. It is used with the empty and partially loaded car. But when the car is loaded

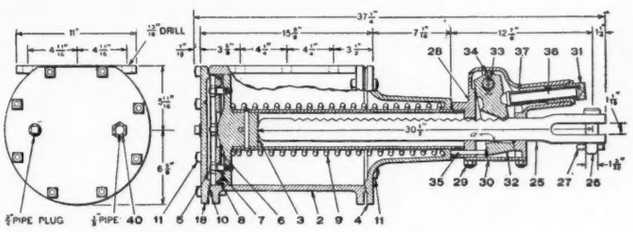


Fig. 2—Load Cylinder, Showing Notched Push Rod and Clutch

beyond a certain point the second brake cylinder is cut into action to assist the first. The total braking force now equals 40 per cent of the weight of the fully loaded car instead of from 15 to 17 per cent with the single capacity brake. The reason 60 per cent braking ratio is not used for the loaded car is that if it were the second cylinder could not be cut in until the car was fully loaded without exceeding the 60 per cent braking ratio. With a 40 per cent braking ratio for the fully loaded car, the load brake can be cut in when the car is a little more than half loaded without exceeding a braking ratio of 60 per cent for that particular condition of loading.

Fig. 1 shows the way the braking ratio ranges for different conditions of car loading, with and without the empty and load brake. Starting with 60 per cent braking ratio for the empty car (i. e., 0 per cent loading) the ratio drops more rapidly at first with the initial loading than it does as the car approaches a fully loaded state (100 per cent loading). This is because a certain addition in load is proportionally smaller the heavier the car is at the time the addition is made.

*Abstract of a paper presented before the St. Louis Railway Club, February 11, 1916.

Two ratios between the loaded and empty weights are given, namely 3.5 to 1 and 4 to 1. The increase in this ratio only means a greater contrast between empty and loaded car braking ratios, and this in turn less uniformity of retardation, with resultant slack action, and less safety of control on mountain grades. If, however, the empty and load brake is installed, it may be cut into load operation with 55.5 per cent loading without exceeding a 60 per cent braking ratio where the weight ratio is 4 to 1, or less, and the corresponding point for a 3.5 to 1 ratio is 53.4 per cent loading.

A line representing a 4 to 1 weight ratio is shown starting from a 40 per cent braking ratio for the empty car and drops to 10 per cent for the loaded car. Where the car is either empty or fully loaded at all times, i. e., having no operation with a partial load, and employs the empty and load brake, this 40 per cent empty braking ratio is most desirable.

This lower braking ratio is also desirable for the reason that it minimizes the effect of serial action in the pneumatic application of brakes on a long train. For a certain manipulation of the brake valve the cylinder pressures on the head end and rear of the train as the brake application progresses will be the same irrespective of the braking ratio. And the difference in cylinder pressures between the head and rear ends will also be the same; but this difference in pressure results in a difference in retardation between the two ends of the train greater in the same proportion as the braking ratio is higher. Therefore, all other things being the same, a condition of slack action in a train due to serial application of the brakes is twice as bad when the braking ratio is uniformly 80 per cent as it is when the ratio is 40 per cent throughout. While the 40 per cent braking ratio is desirable for the empty and load brake, a 60 per cent ratio has been applied for the reason that cars equipped with the empty and load brake may be passed to roads which do not have empty and load brakes, and which therefore are not expected to cut the brake into load position.

The effect the empty and load brake has in reducing the number of slid flat wheels should also be considered. In the first place it is well to review the influence of rail friction or adhesion on the braking problem. Consider the driving wheel of a locomotive, for instance. A certain force is applied at the crank pin, the purpose of which is to turn the wheel. If this force is of sufficient magnitude to overcome the frictional resistance between the wheel and the rail the wheel will slip on the rail, otherwise the wheel will travel along the rail. That is to say, there is always a certain reaction between the rail and the wheel, or in other words a certain thrust of the rail on the wheel (dependent on the pressure between the wheel and the rail together with the coefficient of friction) which, if not overbalanced by the force applied to the crank pin, will cause the wheel to travel on the rail. Exactly the same principles apply to the brake shoe on a car wheel—if the retarding force of the brake shoe on the wheel, which is dependent on the brake shoe pressure and the coefficient of friction of the shoe on the wheel, is greater than the applied force, which is the thrust of the rail on the wheel and is dependent on the pressure of the wheel on the rail and the coefficient of friction between the wheel and the rail, the wheel will slip. Otherwise the retarding force will tend to overcome the applied force. Now further, if a car in motion and with the brakes applied suffers impact in a direction such that the car is accelerated, the rotative speed of the wheels will be increased also. But to accelerate the wheels a certain thrust is required from or of the rail. This is in addition to the thrust caused by brake shoe friction. If the sum of the two thrusts exceeds the adhesion the wheel will slide. The impact lasts a very short time only, and the rail thrust brought into play by this impact lasts only as long. But brake shoe friction in this very short interval of time has jumped up in value, becoming static where it was kinetic before, and the wheel-rail friction has dropped in value, becoming kinetic where it was static or rolling before and the wheel continues to slide. In other words, the impact has "knocked the car off its feet" and brake shoe friction keeps it "off its feet."

However, even though the car is knocked off its feet and thus the wheels slide momentarily, it doesn't always follow that they will continue to slide. For if the pull of the rail with the wheel sliding exceeds the pull of the shoe, the wheel will commence to rotate again and so continue. To slide the wheel from a standstill, or to keep a car off its feet, once it has been knocked therefrom, either the cylinder pressure must be high or the rail bad, or both. Slid flat wheels appear on empty cars much more frequently than on loaded cars.

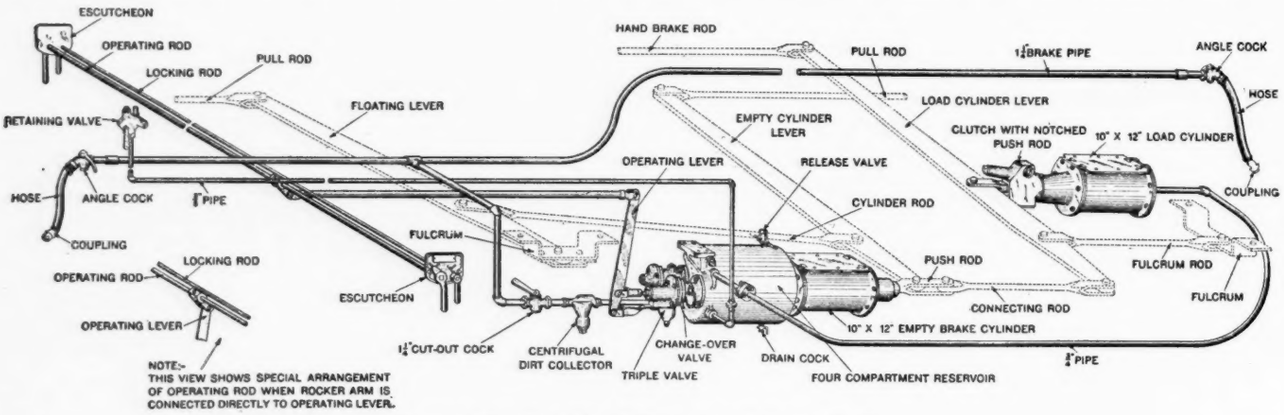


Fig. 3—The Combined Empty and Load Brake

The shocks being greater with the single capacity brake than with the empty and load brake, it is obvious how prolific shocks may be in slid flat wheels, due to lack of uniformity in braking. And thus the role of the empty and load brake in eliminating slid flat wheels and all the other evils arising from slack action is apparent.

In grade service the advantages of the empty and load brake are at first glance more apparent. In descending a grade a certain portion of the car weight is acting to accelerate it, and if this acceleration is not to take place, an equal opposing force must be brought into play to counteract the accelerating force. In calculating train control on grades it is necessary to consider the internal resistance of cars, but this is neglected in figuring stops for the reason that many tests have demonstrated that in bringing a car to a stop the internal resistance is just about equal to the force required to overcome the rotative energy of the wheels. It is a matter of simple calculation to show that, with the same train and under the same conditions, the empty and load brake is as safe on the 3.46 per cent grade as the single capacity brake

is on the 1.45 per cent grade, the only difference being an increase in air consumption of 17 per cent for the empty and load brake. However, the empty and load brake will control a train of loaded cars on a certain grade with only one-half the air consumption required by the single capacity brake with the same train on the same grade. This reserve may be utilized by handling a train with the empty and load brake twice as long, other things being equal, as the empty car brake train and with the same factor of safety. In the matter of coming to a stop on a grade, the stop distance will be, other things being the same, inversely proportional to the braking ratio.

A train equipped with the single capacity brake, averaging 75 per cent of the full service braking power (average cylinder pressure 37.5 lb., an assumption really too high), that will run away on the 2.3 per cent grade will be held at a constant speed of 20 m. p. h. with the empty and load brake and with 45 per cent of the full service braking power (average cylinder pressure of 22.5 lb.—a very conservative assumption), and its reserve braking force enables it to stop from this speed in less than 500 ft.

Air Consumption

The air consumption in braking a railroad train depends upon the number of cars, the brake pipe and auxiliary volumes for each, and the amount and number of brake pipe reductions used. The freight empty and load brake is so designed that when operating in load position, air is admitted to the "empty" cylinder alone until a brake pipe reduction of about 8 lb. has been completed. The load cylinder is then automatically cut into operation. But the empty cylinder has meanwhile taken up all the slack in the brake rigging, the load brake piston not moving at all, due to the use of a special notched push rod and clutch device, until air is admitted to the load cylinder. This cuts down the load brake piston travel to a minimum, making it about 1½-in. instead of the usual 8-in. piston travel. Fig. 2 shows a sectional cut of this device and Fig. 3 the operating mechanism and the relative arrangement of all parts.

Thus, where the two cylinders, the empty and load, are of the same size, the volume of air required for a certain brake pipe reduction is roughly

$$\frac{1.5}{8} = 19$$

per cent more for the two cylinders than for the single cylinder brake, instead of 100 per cent more, as would be ordinarily expected with the use of two cylinders as compared with one. As the empty brake cylinder takes up all the shoe clearance and slack in the rigging, a high leverage ratio may be used for the load cylinder without any of the evil effects of high leverage on the single capacity brake or on the empty cylinder, which accounts for the remarkably low air consumption possible for the empty and load brake.

The superior air consumption performance and reserve braking force of the empty and load brake may be utilized in several ways. The speed of trains down grades may be increased, the speed restriction or limitation now passing from the brake to the question of wheel temperatures. The length of trains and the loading of cars may be increased or all these increases made and still leave the reserve in air supply and braking force comfortably great; and remember that this means increased traffic capacity, reduced unit costs and correspondingly increased net revenue.

Dynamometer car tests made on the Virginian Railway between Princeton, W. Va., and Kellysville, over a 1.5 per cent grade 10.5 miles long, brought out clearly the advantages of the empty and load brake over the single capacity brake. On this grade with a train of 90 loaded cars, 30 of which were equipped with the empty and load brake, these cars being placed at the head of the train, the train was stopped from a speed of 21 m. p. h. while the speed of a similar train composed of all single capacity brakes was reduced to 8 m. p. h. from the same speed with the same brake pipe reduction. Also the average brake pipe reduction required to control the trains was only half as much for the first train as for the second train. The first train was satisfactorily handled at an average speed of 19 m. p. h., whereas the average speed for the second train was only 16.5 m. p. h.

Just preceding the final application at the foot of the grade, with the train having all single capacity brakes, the brake pipe pressure was only 78 lb. instead of 91 lb., as it was to start with. With the similar train having 30 empty and load equipments on the head end, the brake pipe pressure preceding each successive application was maintained at 93 lb., no difference being noticed between the recharged pressure previous to the first application and that just before the stop at the foot of the grade.

Emergency stops from 23 m. p. h. on the grade with trains consisting of one locomotive, dynamometer car, six loaded coal cars and caboose (brakes on locomotive and caboose cut out), were made in an average distance of 1,780 ft., when the cars were equipped with single capacity brakes. A similar train having cars equipped with empty and load brakes was stopped from the same speed in approximately 720 ft., 40 per cent of the distance required to stop with the single capacity brake.

THE PROPOSED CODIFICATION OF BILL-OF-LADING STATUTES

By W. L. Stoddard

Washington, April 12.

The bill of lading in all its intricacies was before both the President and the Interstate Commerce Commission this week. While the President was being invited by representatives of the National Industrial Traffic League to assist them in their campaign for the enactment of the Pomerene bill, aiming to establish a uniform bill of lading, Examiner Satterfield of the commission presided at a conference between railroad men and representatives of the shippers, for the purpose of threshing out their divergent views as to the conditions to be included in bills of lading. At this writing the commission's conferences are still in session, and it is impossible to summarize the points of agreement and disagreement. About 50 men representing both sides were present, sitting daily, morning, afternoon and evening. The bills of lading proposed by the carriers for domestic merchandise, for export, and for live stock were, in the order named, minutely overhauled, examined, re-examined, and discussed; and sections were either adopted or laid aside awaiting further investigation. The question was discussed whether there should be separate bills of lading for coal and for vegetable products. Examiner Satterfield says that the ground is being cleared quite thoroughly, so that the task of the Commission will be greatly lightened.

Shipping interests are agitating for the Pomerene bill-of-lading bill, and through one local newspaper their side of the case is being put forth in loud tones. The point of attack is the House Committee on Interstate and Foreign Commerce which for three successive sessions of Congress has remained entirely inactive on bill-of-lading questions. It is claimed that a majority of this committee favors the Pomerene bill, but that the chairman is obstinately standing out against his colleagues. The President is being besought to bring his influence to bear to stir the chairman or his committee, or both, to action. The shipping interests find one of their greatest obstacles in the proposal to lay this bill aside until the proposed joint committee to study the entire field of railroad legislation shall have made its report.

The Pomerene bill marks the culmination of an effort

which has been in process for a good many years. Some fifteen states have adopted the measure prepared by the American Bar Association, and the shippers, backed by the American Bankers' Association, the National Council of Grain Exchanges, the National Grain Dealers' Association, the Millers' National Federation, the New York Cotton Exchange, and the New York Produce Exchange, together, of course, with the National Industrial Traffic League, declare that there is practically no opposition by the railroads to the proposed federal legislation.

BAKING PAINT ON STEEL CARS

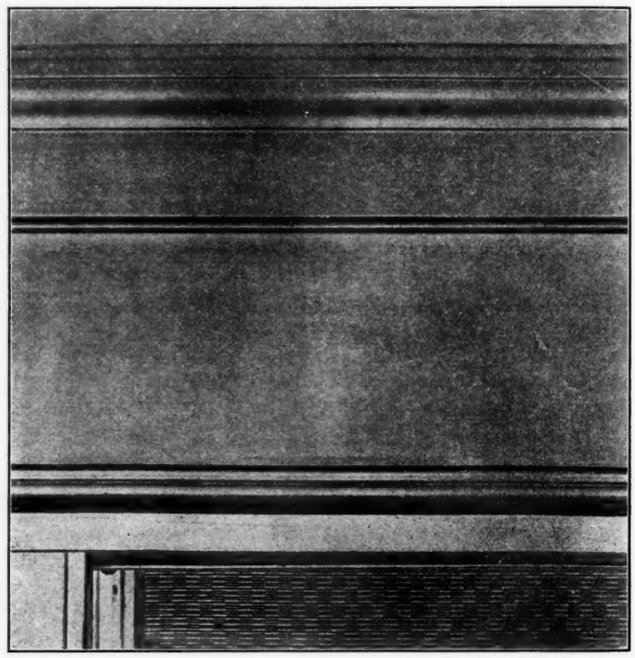
After making a large number of tests on small steel panels, it was decided by the Pennsylvania Railroad in 1912 to build an oven sufficiently large to bake the paint on an entire car, and this first oven was completed in January, 1913. The oven and the process of painting were described in the *Railway Age Gazette,* April 11, 1913, page 830.

The illustrations show part of the interior and also the number plate of the first car painted in this way, after it had been in service for two years. The car has now been in service for 34 months, and the condition is still nearly as good as when the photographs were taken. In the course of two or three months it will be returned to the shops for the purpose of having the color touched up where it has been abraded, after which it will be revarnished by the baking process for the first time since it was built, and returned to service. The oven has been in continuous service since it was built, the only changes made being the introduction of additional radiators, and a heat control device. This

Number Plate of First Car Painted by the Baking Process, After Two Years' Service

can be set to automatically control the flow of steam to the radiating coils and thus give any desired temperature which the painter may wish to obtain. The oven is 15 ft. high, 13 ft. wide, both clearance measurements, and 93 ft. 3 in. long. It is lined with a ⅛-in. steel shell. This is insulated with magnesia lagging 3 in. thick, the insulation being held in place by an outer jacket of galvanized iron. The doors are insulated with the same kind of lagging which is held in position by steel plates on the outer and inner sides. The arrangement of the steam coils makes it possible to obtain any desired temperature up to 275 deg. The oven is equipped with ventilators on the sides at the bottom for the admission of air, and also with four ventilators in the roof, which may be opened or closed, as desired. The ventilators provide for the introduction of the fresh air required in drying the various paint coats, and also allow the volatile portion of the coats used, the turpentine for example, to escape through the roof. The different coatings used on the cars are the same as those used on car 156, shown in the photographs.

The process of painting a car is as follows: The car is first painted inside and out with a priming coat. This is baked for about three hours at 250 deg. F. The primer is designed to obtain a product which will adhere firmly to the metal and serve as a protective coating, which will prevent the steel from rusting, and will also serve as a foundation on which to build the remainder of the constituents entering into the surface coating. This is followed by necessary glazing and putty to fill all deep depressions and indentations in the steel used. A number of surface coatings are then applied, the number varying from one to perhaps four, de-



Condition of Interior of First Car Painted by the Baking Process, After Two Years' Service

pending on whether the steel used is rough or relatively smooth. Each coat of material applied is baked. The car is then rubbed with emery cloth and oil for the purpose of securing a smooth, flat surface. The various colors desired on the car are then applied. Two coats of these are required and each coating of color is also baked. The car then receives the necessary striping, lettering, etc., after which it receives two or three coats of high grade baking finishing varnish. After the varnish on the inside of the car has been rubbed, the car is ready for service.

When the first oven was built, it was hoped that the following advantages would be realized: A durability at least double that obtained by the air dry process; longer retaining of newly painted appearance; obviation of cracks in the varnish; easier keeping clean of the outside of the car; reduction in the time of keeping a car in the shop for painting from about 16 days to from 5 to 7 days; and the reduction of the number of cars in the shop at any one time to about one-half the previous number. The baking system has now been in use almost three years, insofar as one oven could do the work, and the objects hoped for have been attained. Two additional ovens are now being provided for, and it is probable that as soon as they have been put in service a still further extension of the system will be made.

BUSINESS AND BANQUETS.—The Macon (Ga.) chamber of commerce has appointed 12 members as a freight bureau section of the chamber. A banquet will be held in the near future.

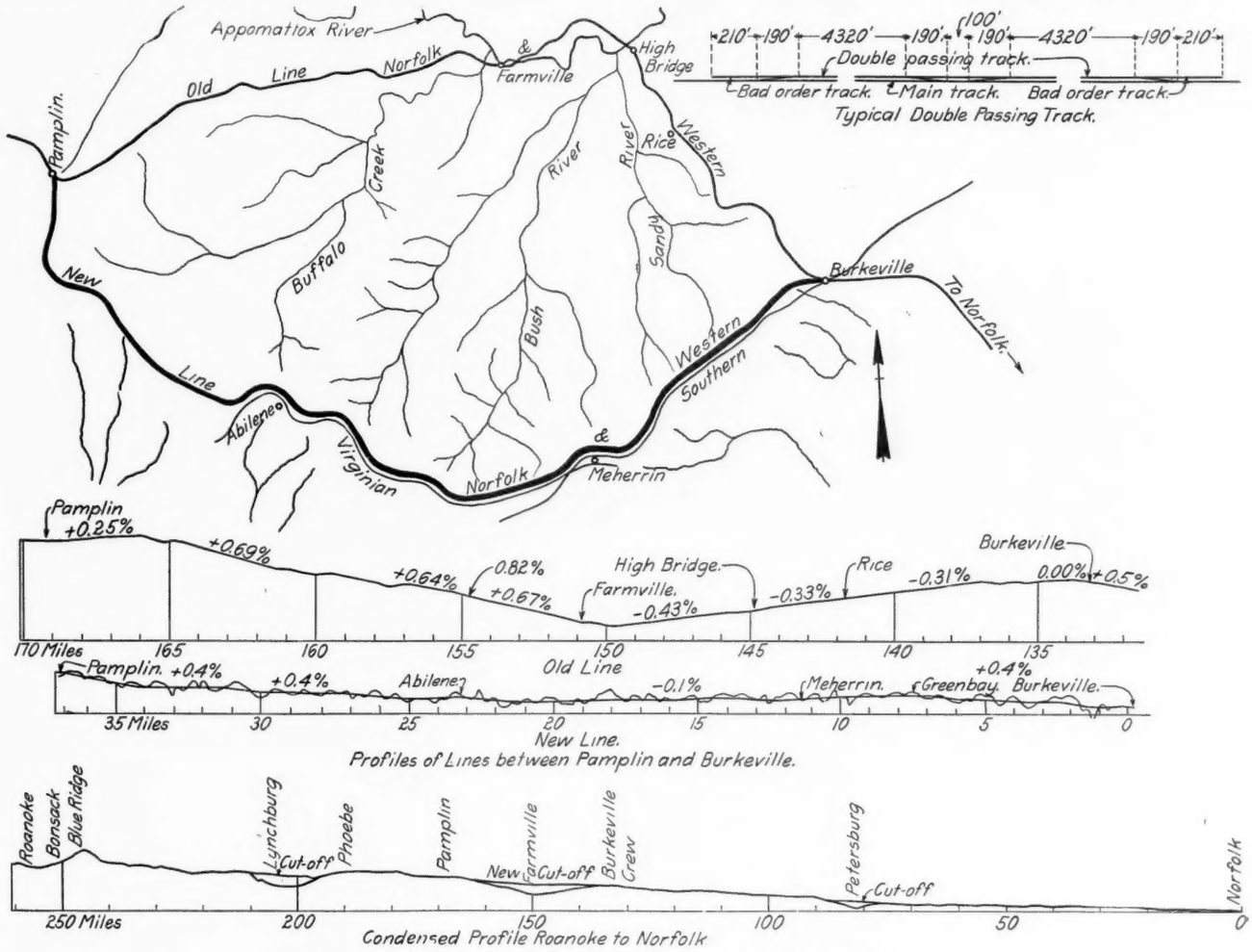
A New Cut-Off on the Norfolk & Western

Exceptional Grades Obtained for a Line to Eliminate Pusher Service and Complete 256 Miles Double Track

The Norfolk & Western has just completed a 37-mile low-grade cut-off between Burkeville, Va., and Pamplin, which is the last of a series of improvements under way since 1901 for the purpose of providing double track for the 256 miles between Roanoke and Norfolk, Va., known as the Norfolk division. In addition the completion of this line eliminates the last pusher grade and affords a maximum 0.25 per cent grade for the heavy eastbound coal traffic for a distance of 190 miles west from Norfolk. The location for this new cut-off is unusual, in that a 0.1 per cent maximum eastbound grade has been obtained through rather heavy country and because no bridge was required in the entire distance.

337,300 lb. on drivers are used in the engine district between Roanoke and Crewe, and handle a 5,000-ton train unassisted over the portion of the line east of Phoebe. In order to handle this same train over the 0.5 per cent grades these engines "double-head" with a consolidation locomotive between Roanoke and Phoebe, with a pusher engine on the 1.17 per cent helper grade over the Blue Ridge. With solid trains of Norfolk & Western 90-ton coal cars it is possible to increase this tonnage rating 250 tons.

The new line between Burkeville and Pamplin has been built for single track and will in general be used for the eastbound coal traffic, the old line being retained for passen-


Appomattox River
Old Line
Norfolk & Western
Farmville
High Bridge
Pamplin
Creek
Buffalo
River
Rice
Sandy
Burkeville
To Norfolk
New Line
Bush
Western Southern
Abilene
Virginian
Norfolk & Western
Meherrin
210' 190' 4320' 190' 100' 190' 4320' 190' 210'
Double passing track.
Bad order track. Main track. Bad order track.
Typical Double Passing Track.
Pamplin +0.25% +0.69% +0.64% 0.82% +0.67% High Bridge. Farmville. -0.43% -0.33% Rice -0.31% Burkeville. 0.00% +0.5%
110 Miles 165 160 155 150 145 140 135
Old Line
Pamplin. +0.4% +0.4% Abilene. -0.1% Meherrin. +0.4% Greenbay. Burkeville.
35 Miles 30 25 20 15 10 5 0
New Line.
Profiles of Lines between Pamplin and Burkeville.
Roanoke Bonsack Blue Ridge Lynchburg Cut-off Phoebe Pamplin New Farmville Cut-off Burkeville Crew Petersburg Cut-off Norfolk
250 Miles 200 150 100 50 0
Condensed Profile Roanoke to Norfolk

Map and Profiles of New Cut-Off on the Norfolk & Western

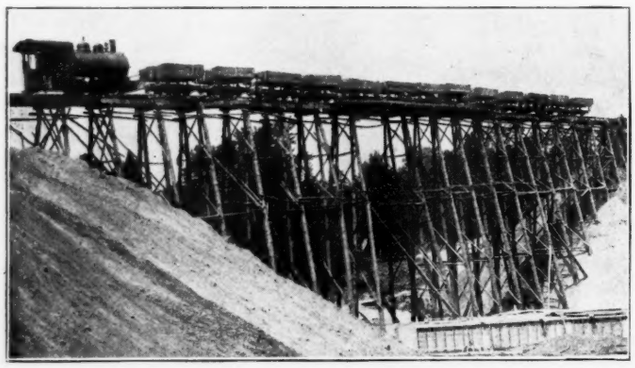
The accompanying profile of the Norfolk division demonstrates the economies of operation to be attained by the completion of the improvement outlined above. A similar cut-off was completed at Lynchburg in 1907, and another at Petersburg in 1909. The engine districts extend from Roanoke to Crewe, 126 miles, and from Crewe to Norfolk, 130 miles.—There is a ruling grade of 0.5 per cent from Roanoke to Phoebe with a pusher grade of 1.17 per cent from Bonsack to the summit of the Blue Ridge. From Phoebe to Norfolk, 190 miles, there is a 0.25 per cent ruling grade eastbound with no pusher grades. Mallet engines having a weight of

ger traffic and westbound freight trains. It is expected, however, to give the despatcher authority for rather flexible operation whereby it will be possible to obtain the maximum benefit of the lighter grades on the new line for trains in each direction.

Comparison of the Old and New Lines

The old and new lines between Burkeville and Pamplin are on widely separated locations, the former being a valley line and the latter a ridge line. Commencing on a summit at Burkeville, the old line descends in a northerly direction

along the valley of the Sandy river to the Appomattox river which it crosses twice, descending 217 ft. in the 16 miles between Burkeville and the bottom of the sag, one mile east of Farmville. Turning to the west the line makes a steady climb upgrade to a summit about two miles east of Pamplin, a rise of 399 ft. in 17 miles. The total distance is 35.6 miles with a maximum westbound grade of 0.82 per cent uncompensated, and a maximum eastbound grade of 0.43 per cent, which until the completion of the new line necessitated a pusher for eastbound traffic on the 10 miles between Farmville and Rice. One of the crossings over the Appomattox



Filling from a Trestle Near Burkeville

river involves a viaduct 2,419 ft. long and 107 ft. high, rebuilt in 1913 at a cost of $500,000.

The new line avoids the drop to the Appomattox river by turning to the southwest at Burkeville and following the ridge dividing the waters of the Appomattox and Roanoke rivers for the entire distance to Pamplin. The line parallels the Danville-Richmond line of the Southern to Meherrin, a distance of 12 miles, and then follows the general route of the Virginian as far as mile 25, where it turns northeast toward Pamplin. The new line is 37.2 miles long, 1.6 miles

A Bad Slide in an Embankment

more than by the old route. The maximum curve is 1 deg. 30 min. as compared with a maximum of 4 deg. on the old line. The maximum westbound grade is 0.4 per cent, and the maximum eastbound grade is 0.1 per cent. The total rise and fall is 47 ft. as compared with 253 ft. on the old line.

Like the other low-grade lines on the Norfolk division this line has been graded for single track, but all structures and right of way provide for two tracks. The line is remarkable for the entire absence of bridges and there are very few culverts. Drainage is cared for mainly by cast iron pipes and where box culverts are necessary reinforced concrete is used. The largest piece of masonry is an 8-ft. by 8-ft. skew box culvert containing 1,399 cu. yd. of concrete. All the important county roads are carried across the tracks by over-head steel bridges or concrete under-crossings, about 21 such structures having been provided for.

The new line has been constructed at a considerable saving over the estimated cost of providing double track on the old location and a much lower grade has been secured than would have been possible on the old line. Considerable interest is added to the location adopted for the new line by the fact that a similar location was considered at the time when the original line was built in 1853. Although recognizing the advantages of the ridge location a number of influences led to a decision to build the line through Farmville, among which D. O. Sanford, chief engineer of the then South Side railroad, recorded the following: first, the loss of a large amount of tonnage from Farmville if the ridge route were followed; second, the raising of a subscription by citizens of Farmville to the extent of $100,000 if the line were built through their city; third, more rapid construction of the

A Shovel Working in a Wet Cut Near Meherrin

route through Farmville, and fourth, a greater length by five miles of the ridge location as then laid out.

General Characteristics

The country along the new location is gently rolling, permitting a general balancing of earth work and in most cases avoiding exceptionally heavy work. There are three cuts a mile or more in length and one embankment a mile long although it is not over 15 ft. high. The greatest depth of cut and height of embankment is about 55 ft. The total excavation on the 37 miles amounted to about 3,000,000 cu. yd. The country is sparsely populated and very little of it is under cultivation. A large part of it is covered with a growth of small timber necessitating clearing and grubbing for most of the distance. The material encountered was almost entirely red clay overlaid with a thin layer of gray top soil. Very little rock was encountered. The highways in the vicinity of the line are generally bad, but the presence of other railroads on parallel locations for 25 miles out of the 37 made it a simple matter to move in the construction equipment.

The roadbed for embankment was made 24 ft. wide plus one foot for each 10 ft. of height with 1½ to 1 slopes. The cuts have a base width of 30 ft. with standard slopes of 1 to 1. However, as the material will stand almost vertical and is much easier to remove to a relatively steep slope, the contractors were instructed to trim the cuts to slopes of 1/3 to 1

by moving out the toe of the slope and moving in the top of the slope each one-third of the slope distance. Passing tracks 9,000 ft. long have been provided at intervals of eight miles. As shown on the accompanying sketch each passing track is provided at each end with a short section of stub track to facilitate the setting out of bad order cars.

Construction

The work was divided into five sections numbered consecutively from Burkeville. The contract for section No. 1, six miles long, was let to Patterson & Moran, New York, who used three No. 60 Marion steam shovels, narrow-gage, 19-ton locomotives and four and five cubic yard dump cars. The work was carried on for the most part in two shifts of 10 hrs. each. Considerable difficulty was encountered on this section with an embankment of 150,000 cu. yd. about one mile west of Burkeville. The filling was done in a single lift from a construction trestle and for the purpose of permitting the completion of an 8-ft. by 8-ft. box culvert in the deepest part, an opening was left in the embankment temporarily for a distance of 200 ft. No difficulty was encountered until work was started on the closing of this gap. As soon as the embankment had been brought up almost to the level of the track, the toe of the slope pushed out on each side and the top of the embankment settled about 20 ft. This occurred repeatedly as more material was dumped in. The condition was accounted for by the fact that the clay placed in the lower portion of the embankment at this point was exceedingly wet on account of the excessive rains, and also by the presence of mica and streaks of graphite in the clay. The slides were finally overcome by hauling drier material to the foot of the slopes in wheel scrapers, where it was used to form a compact toe by placing it with drag scrapers. The difficulties encountered with these slides necessitated the placing of 100,000 cu. yd. of additional material and flattening the slopes to 2 to 1.

About 2½ miles west of Burkeville there is a cut 1¼ miles long with a depression in the center where a waterway crosses the line with the stream bed 15 ft. above grade. Instead of attempting to syphon the water, a drainage ditch was provided on the down stream side which had to be carried a distance of 900 ft. from the right of way to secure an outfall. In the same vicinity two miles of country road were relocated parallel to the two railroads (the Norfolk & Western and the Southern), to eliminate several grade crossings.

The Robert Grace Contracting Company, Pittsburgh, had the contract for sections No. 2 and No. 3, 12 miles. The heaviest work on these sections included two cuts 1 mile and 1½ miles long respectively just west of Meherrin and a cut at mile post 18, 1 mile long, 55 ft. deep, and containing 255,000 cu. yd. This cut is parallel to and 255 ft. from a cut on the line of the Virginian which involved rock excavation for its entire depth, about 45 ft. Under the circumstances estimates for the cut on the new line were made on the assumption that it would be almost entirely rock excavation. This proved an error, however, for no rock was encountered.

Steep Banks in a Shovel Cut

The Robert Grace Contracting Company used three Bucyrus No. 70C, and two Marion No. 60 steam shovels. In addition to this equipment there were three sub-contractors having one steam shovel each, one of them being a Marion No. 30 road shovel. All cars and locomotives on this section were narrow gage except those of one sub-contractor.

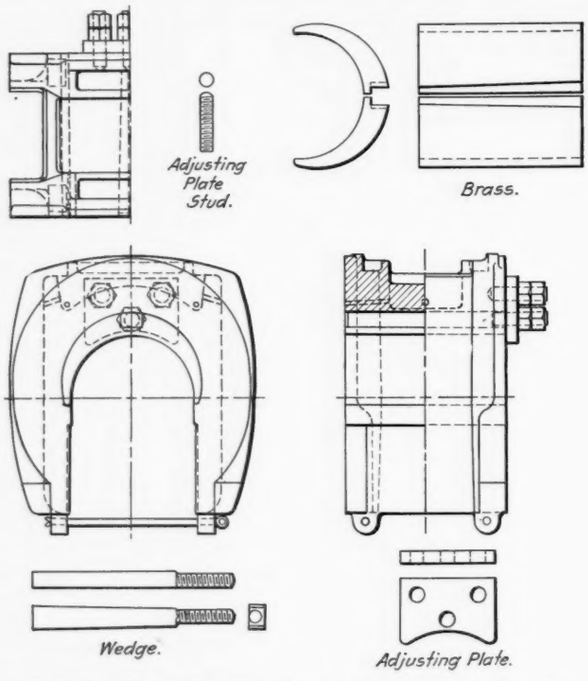
Rinehart & Dennis, Charlotteville, Va., had section No. 4, 10 miles, and J. J. Sheahean, Roanoke, Va., had section No. 5, 9 miles. The heaviest work in the last section was in a cut at mile post 31, which was 4,000 ft. long and 42 ft. deep and contained 174,088 cu. yd. This cut gave considerable trouble from sliding as a result of heavy rains and the fact that the line at this point was located in the center of the natural waterways in both directions from the summit. Surface ditches had been provided in anticipation of trouble, but when the slides occurred considerable sections of the ditches were carried into the cut. Originally the banks in the cut

stood practically vertical, but where the slides occurred the sides were cut back by blasting until 1 to 1 slopes were secured.

The location surveys for the new line were started in January, 1915, and actual construction was commenced in May of that year. The line was completely ready for operation on March 1, 1916, when the first tonnage train was run over it. The unusually heavy rainfall occurring during a large part of the summer of 1915 interfered materially with the schedule outlined for the completion of the work and put the contractors in serious difficulties at times, as there were frequently days when work had to be stopped entirely. The location and construction of the line was under the general direction of J. E. Crawford, chief engineer, and A. Brunner, assistant engineer, of the Norfolk & Western. The resident engineers were H. N. White, H. H. Derrick, G. F. Hughes, and V. D. Johnson.

DRIVING BOX BRASS

The illustrations show a departure in sectional locomotive driving journal bearings or brasses. The Langton brass, of which there are now 270 in service, has been designed with a view to simplifying the operation of applying and removing such brasses. This operation, heretofore, has involved the shopping of the locomotive, dropping the wheels and otherwise dismantling, with an attendant expense, including the loss of the earning capacity of the locomotive, often amounting to $125 or more. With the use of the Langton brass it is possible to crown a pair of journals in less than

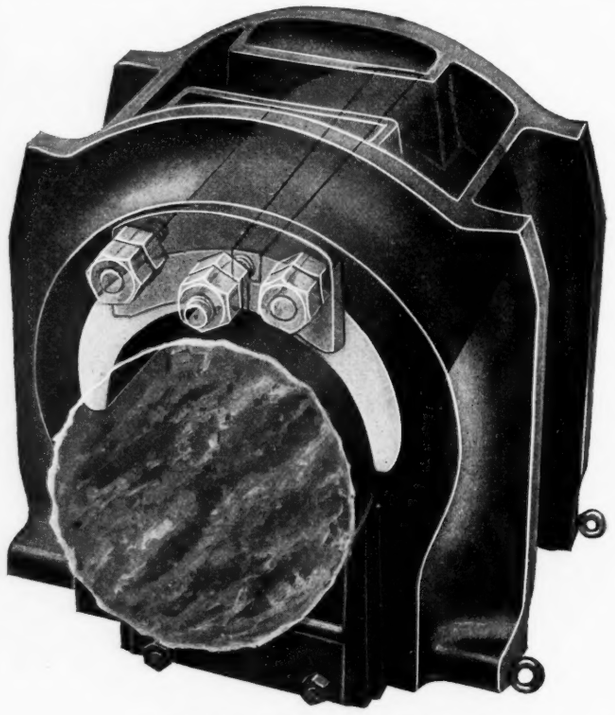


Details of the Construction of the Langton Brass

two hours, at a cost of less than $3.00, without the use of a drop pit or any other facilities than a journal jack, making it possible to do the work during the lay-over period, consequently the locomotive need not miss its regular run. Brasses can be closed on the journal in less than 30 min.

No change of existing patterns of boxes or brasses is required. The solid brass is simply split lengthwise and provided with a tapered groove or key-way at the top to receive a tapered key or wedge which forms the adjusting means. A small holding plate fastened to the inside face of the box by means of two studs completes the arrangement. It can be manufactured at any shop having a lathe, planer or shaper, and drilling machine, and can be applied at any roundhouse.

In applying a solid brass the driving box, weighing several hundred pounds, has to be handled and trucked a number of times, while with the Langton brass the heaviest part moved



Langton Driving Box Brass

is the brass itself. This brass has been in service nearly two years on all classes of power and has demonstrated its entire practicability. It has been developed by J. W. Small and G. H. Langton, Portsmouth, Va.

MONEY FOR RUSSIAN RAILWAYS.—A matter of considerable interest in connection with the $1,000,000,000 loan about to be issued in Russia is that a portion of it is to be devoted to railway construction, but how much is not specified.

ALLOWANCE TO ENGLISH RAILWAYS FOR NEW CAPITAL.—An important question is still outstanding between British railway companies and the government with relation to the allowance to be made for recent capital expenditure from which the companies at present get no financial benefit on account of the war. The Metropolitan completed and put in use last May a new viaduct at Kilburn, forming the last section of the widening between Finchley Road and Wembley Park, and considerable additional traffic has been attracted to the railway by the improvement in the train services which the new lines have enabled the company to effect. Under the terms of the arrangement with the government no benefit at present accrues to the company from the earnings of new lines and works brought into use since 1913, although the company has to bear the interest on the capital raised for their construction. The South-Eastern & Chatham in August, 1914, was looking forward to a very large development owing to the large capital expenditure made in previous years on the marine station at Dover and on improvements giving greater facilities at Margate and other stations. War deprived it of that benefit, and the present arrangement with the government does not define any compensation for that loss.

General News Department

The forty-sixth annual meeting of the Operating Officers' Association of the Chicago, Burlington & Quincy was held in Chicago last week.

The roundhouse of the Northern Pacific at Dickinson, N. D., together with the shops connected with it, was damaged by fire April 1 to the extent of about $100,000, this sum including damage to five locomotives.

The New York, New Haven & Hartford has increased the pay of shopmen, all classes, 1½ cents an hour. This increase benefits 4,500 employees, and the estimated gross increase in payrolls is $200,000 a year.

The Chicago, Milwaukee & St. Paul has increased the pay of employees and the car repair department 1½ cents an hour. The Chicago & North Western has made increases, ranging from $2.50 to $7 monthly, in the pay of baggagemen and other station and freight house employees.

The special committee of the American Railway Association on the Prevention of Accidents at Highway Crossings held a meeting at Chicago on April 7 and formulated a preliminary report to be submitted to the association at its May meeting.

The M. K. & T. Employees' Magazine for March prints the portraits of 13 station agents who were marked 100 per cent in their examination on a list of 200 questions, put to them, without notice, by an agent of the freight claim department, to test their understanding of the regulations.

The law of the state of New York limiting the time within which animals may be kept in cars without feed or rest, or water, has been amended so as to conform to the federal law on the same subject. Hitherto the time limit in New York has been 24 hours, and the minimum time for rest has been 10 hours.

James Peabody, statistician of the Atchison, Topeka & Santa Fe, gave a lecture before the students of the Northwestern University School of Commerce, Chicago, on April 5, discussing the so-called Oklahoma plan for the allocation of railroad expenses, which was prepared by the committee of which he was chairman.

The Southern Pacific by a recent law is called upon to file in the state of Utah amended articles of incorporation, and to pay a tax of $104,750, this sum being a certain percentage of the capitalization of the company. The road has notified the officers of the state that it will refuse to recognize the new law; and the state is expected to begin proceedings at once in court.

In the Federal Court at Richmond, Va., April 8, three railroads were fined $100 each for violations of law: The Southern in 2 cases where cattle had been kept in cars more than 28 hours, and a third case where the quarantine law had been violated; the Seaboard Air Line for five offenses against the quarantine law, and the Atlantic Coast Line for two violations of the 28-hour law, and one of the quarantine law.

The Buffalo, Rochester & Pittsburgh, at its four Young Men's Christian Associations, at Punxsutawney and Du Bois, Pa., and East Salamanca and Buffalo Creek, N. Y., has installed moving picture machines, which show "safety first" films, and also afford the employees entertainment and religious instruction. R. D. Emerick, general secretary of the B. R. & P. associations, has interested many who were not before much concerned in that part of the work.

The patrolmen of the Forest Service of the United States Department of Agriculture are being provided with portable telephones, made mostly of aluminum and weighing 2½ pounds each, the invention of a Forest officer, R. B. Adams, of Missoula, Montana. The telephone sets hitherto used weigh ten pounds each. A forest ranger, equipped with this telephone, a few yards of light emergency wire, and a short piece of heavy wire to make the ground connection, can cut in anywhere along the 20,000 miles of Forest Service telephone lines and get in touch with headquarters.

The Buffalo, Rochester & Pittsburgh is conducting an extensive first-aid-to-the-injured campaign. For a period of eight weeks there will be instruction classes at Rochester, Buffalo, East Salamanca and six other places, in charge of twelve physicians who are experts in first aid practices. Since this road started giving first aid instruction, about four years ago, two of its employees, M. E. Moynihan and James Haley, have received first prizes from the American Red Cross Society, and two others, C. J. Widner and F. W. Knapp, have received second prizes from the same organization for saving lives.

The Freight Car Situation

The American Railway Association's car report for April 1 shows aggregate surpluses of 46,921 cars, which is about 4,000 greater than the number reported on March 1; and aggregate shortages of 43,271, which is 19,000 less than the shortage one month previous. This is the largest shortage reported in April since 1907. The present box car shortage appears to be most pronounced in northwestern and central freight association territory.

Increased Wages on Southern Roads

Following a general conference between the officers of the principal roads and representatives of machinists and certain other classes of employees, agreements have been reached for increases in pay, of the classes affected, on substantially all of the lines in the southeastern states. An officer of the Chesapeake & Ohio, speaking for that company, says that about 9,000 of its employees are affected, and that the increase in pay will be 6 per cent. On the lines of that company the gross additional expenditure will be $400,000 a year; this goes to machinists, telegraphers, signalmen and trackmen. For the telegraphers the new rate applies from January 1 last, and for the other classes from March 1 last.

"Don't Ride a Free Horse to Death"

The Long Island Railroad, which is very liberal with passes to employees, both season and trip, has issued a notice that trip passes must not be used on July 4 and on certain other holidays, nor on trains to the crowded seashore resorts; and in connection with the notice gives the following suggestions on courtesy:

"Each card pass issued to male employees this year was accompanied by a slip stating that the pass was issued with the distinct understanding that its holder is not permitted to occupy a seat to the exclusion of a revenue passenger, and that failure to observe this rule will result in recall of pass. . . . Many have shown their appreciation by taking a personal responsibility in giving up their seats readily and without notice from the conductor. This is as it should be. The conductors and trainmen should not be obliged to ask employees to obey a rule that is familiar to everyone.

"There may have been some lapses in living up to the rule because you felt that you would attract attention to yourself and become embarrassed, particularly if the passenger happened to be a man. The very best way to avoid embarrassment of this kind is, to first allow passengers to be seated, and, if necessary, *be the last one on the train.* If you are seated and you see passengers standing around you, even though you know there are vacant seats elsewhere, you should get up and move to a less crowded part of the train.

"Small acts of courtesy of this kind have decided the question of families settling along the line of the road. Any discourteous act might keep them away. The public is naturally so inclined to judge a railroad by the employees with whom they come directly in contact that it is incumbent upon us all to exercise the highest degree of courtesy and consideration for their com-

fort. The record of our growth shows that we are not lacking in these most important qualifications, but we must not be satisfied with the reputation we have established; we must place this road in the front rank for courtesy, consideration and comfort."

National Industrial Traffic League

The National Industrial Traffic League held its spring meeting at Baltimore, April 6, president G. M. Freer, of Cincinnati, in the chair. The principal discussion was on the report of the bill-of-lading committee. The League will recommend the adoption of a form in which those of the present conditions, which are included in paragraphs 2, 4, 6, 7 and 9 will be omitted, or much modified; and the League will recommend that section 3 include a provision requiring that in case of loss or destruction of freight immediate notice be sent to both the consignor and the consignee.

The League adopted a resolution calling upon the railroads and their employees to settle their differences in regard to wages by arbitration.

Members of the League went from Baltimore to Washington to urge action by the Interstate Commerce Commission and by Congress looking to the adoption of a standard bill of lading which shall have the backing of federal statutory authority.

The June Mechanical Conventions

Official circular No. 2, issued under date of April 12 by J. D. Conway, secretary of the Railway Supply Manufacturers' Association, says: "Indications are that the June conventions will bring out a larger attendance than ever before. Exhibit space in the main building and annex is all taken, but there is still some space left in Exhibition hall, Machinery hall and Machinery Hall extension."

The circular contains information relative to the hotel accommodations, giving a detailed list of all the Atlantic City hotels and their rates, and information concerning installation of exhibits, shipping, hauling and trucking, signs, electrical work, floral decorations, photographs, etc. Arrangements made for special trains provide for a train leaving Chicago for Atlantic City via the Pennsylvania Lines without change, known as the M. C. B. Special for convention guests, on Monday, June 12, at 3 p. m., reaching Atlantic City about 2 p. m. the following day. The fare for the round trip will be $34.50. Special accommodations will be made on the Central of New Jersey and the Pennsylvania trains leaving New York for Atlantic City on Tuesday, June 13.

New York Railroad Club

At the regular meeting of the New York Railroad Club, to be held in the Engineering Societies' building, 29 W. 39th street, New York, on April 21, a paper will be presented by Dr. Thomas R. Crowder, director of the department of surgery and sanitation of the Pullman Company, entitled: "Passenger Car Sanitation."

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AIR BRAKE ASSOCIATION.—F. M. Nellis, Room 3014, 165 Broadway, New York Next convention, May, 2-5, 1916, Atlanta, Ga.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Next meeting, June 20-23, 1916, Cincinnati, O.

AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Next convention, May 22-24, 1916, Hotel Sherman, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June 19, 1916, Atlantic City, N. J.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting June 27 to July 1, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesdays in month, except July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Spring meeting, April 11-14, Hotel Grunewald, New Orleans, La.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, Rooms 1116-8, Woodward Bldg., Washington, D. C. Annual meeting, June 28, 1916, Hotel Statler, Detroit, Mich.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyrdon, 1214 McCormick Bldg., Chicago. Semi-annual meeting with Master Car Builders' Association. Annual convention, October, 1916, Chicago.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—Willis H. Failing, Terminal Station, Central of New Jersey, Jersey City, N. J. Next meeting, May 17, 1916, Hotel Traymore, Atlantic City, N. J.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 20-22, 1916, St. Paul, Minn.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, June 27-28, Boston, Mass.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September, and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

CINCINNATI RAILWAY CLUB.—H. Boutet, Chief Interchange Inspector, Cin'ti Rys., 101 Carew Bldg., Cincinnati. Regular meetings, 2d Tuesday, February, May, September and November, Hotel Sinton, Cincinnati.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Traffic Manager, R. F. & P., Richmond, Va. Annual session, May 17, 1916, Washington, D. C.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month. Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—J. G. Crawford, 547 W. Jackson Blvd., Chicago. Annual meeting, May 15-18, Hotel Sherman, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 23-26, 1916, Hollenden Hotel, Cleveland, Ohio.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June 14, 1916, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C, Collingwood, Ohio. Annual meeting, May 15-17, 1916, Hotel Statler, Detroit, Mich.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders' and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, April 20, 1916, Piedmont Hotel, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK.—Roy S. Bushy, Firemen's Bldg., Newark, N. J. Regular meetings, 1st Monday in month, except July and August. The Washington, 559 Broad St., Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen't Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June, 20, 1916, Toronto, Ont.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's Office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Grand Pacific Hotel, Chicago.

WESTERN SOCIETY OF ENGINEERS.—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JANUARY, 1916

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.	Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Michigan Central	1,803	2,110,205	778,014	3,272,174	337,866	524,478	65,274	1,266,886	62,382	79,161	2,327,048	945,126	140,000	804,217	539,101
Midland Valley	380	105,473	34,377	146,596	24,110	24,026	2,512	52,790	.....	6,026	109,464	37,132	7,550	29,542	1,587
Minneapolis & St. Louis	1,646	676,357	143,001	876,224	89,254	108,897	18,462	342,178	1	27,128	585,921	290,304	40,911	249,261	35,714
Minneapolis, St. Paul & Sault Ste. Marie	4,229	1,930.612	548,445	2,675,202	220,848	356,485	47,593	870,175	13,790	56,648	1,561,126	1,114,076	114,524	999,552	539,628
Missouri & North Arkansas	365	50,318	25,278	82,366	27,732	20,099	3,494	36,462	.....	5,328	93,115	—10,748	5,800	—16,606	13,593
Missouri, Kansas & Texas System	3,865	1,613,561	643,680	2,471,447	748,741	485,306	60,320	974,199	19,726	96,988	2,384,657	86,789	131,868	—45,481	—724,144
Missouri, Oklahoma & Gulf	334	77,148	18,873	100,490	31,896	33,959	4,307	56,128	110	7,590	133,991	—33,501	8,279	—41,779	—32,185
Missouri, Oklahoma & Gulf Ry. of Texas	125	18,194	306	18,654	3,519	3,142	2,138	9,449	.....	1,761	20,010	—1,356	280	—1,636	—8,396
Missouri Pacific	3,931	1,751,129	354,293	2,313,393	320,069	531,512	67,080	948,126	6,990	58,206	1,931,277	382,116	108,064	273,222	21,010
Mobile & Ohio	1,122	781,777	100,960	937,748	91,627	193,243	38,265	341,609	2,434	32,291	699,469	238,280	34,593	203,266	—24,255
Monongahela	108	150,869	8,503	161,678	20,905	17,940	525	36,224	.....	3,464	79,058	82,621	4,000	78,621	.....
Morgan's La. & Texas R. R. & S. S. Co.	405	243,587	79,219	354,251	60,416	65,329	12,153	136,894	2,073	11,765	288,611	65.640	21,667	43,726	7,933
Nashville, Chattanooga & St. Louis	1,231	734,915	217,879	1,053,223	98,201	188,385	48,933	397,002	13,864	36,868	783,086	270,137	26,000	243,945	162,126
Nevada Northern	165	133,754	9,784	147,999	13,847	13,361	637	32,111	116	3,936	64,008	83,991	6,404	77,568	61,192
New Orleans & North Eastern	204	229,704	48,226	308,892	35,948	49,359	12,824	103,834	6,683	11,712	220,227	88,665	15,500	73,165	15,391
New Orleans, Mobile & Chicago	402	125,791	24,089	157,739	26,258	30,793	4,703	51,852	—3	6,676	120,279	37,460	6,486	30,886	5,148
New Orleans Great Northern	285	109,344	26,423	153,420	18,163	21,087	2,629	42,808	162	7,058	91,908	61,512	3,392	58,066	22,490
New Orleans, Texas & Mexico	286	116,956	23,333	145,836	31,597	25,879	4,374	50,288	.....	9,666	121,803	24,033	1,501	22,479	18,159
New York Central Railroad	6,093	10,402,140	3,814,029	16,476,572	1,472,996	2,974,185	231,254	5,731,875	229,393	351,149	10,990,853	5,485,720	754,162	4,730,464	2,523,707
New York, Chicago & St. Louis	569	1,127,695	90,139	1,260,213	83,400	281,030	42,554	500,206	4,156	21,441	932,786	327,427	40,000	286,908	224,042
New York, New Haven & Hartford	2,005	3,018,368	2,266,813	6,003,545	696,058	929,786	38,708	2,481,523	82,563	154,436	4,342,289	1,661,256	240,000	1,420,462	362,524
New York, Ontario & Western	568	518,604	73,681	684,156	54,970	126,185	7,616	304,299	.....	15,107	508,177	175,979	21,000	154,980	47,978
New York, Philadelphia & Norfolk	112	306,618	33,262	369,247	33,193	68,821	4,523	137,489	4,156	10,487	258,618	110,629	10,000	100,620	90,592
New York, Susquehanna & Western	140	234,017	52,733	319,234	19,607	32,301	2,012	154,833	.....	7,564	216.277	102,956	14,100	88,307	23,732
Norfolk & Western	2,049	3,907,207	481,958	4,538,356	438,367	875,307	58,450	1,210,517	9.698	74,428	2,643,639	1,894,718	175,000	1,719,640	923,654
Norfolk Southern	908	249,967	82,337	356,175	37,511	55,459	6,949	132,244	164	17,746	250,072	106,103	12,855	91,840	53,462
Northern Pacific	6,510	4,069,064	918,125	5,456,702	413,067	580,970	84,065	1,827,803	72,880	91,544	3,043,295	2,413,407	382,571	2,030,071	997,626
Northwestern Pacific	507	92,883	94,174	220,686	60,838	38,600	4,343	115,831	.....	8,514	224,750	—4,064	17,021	—21,093	—10,184
Oahu Ry. & Land Co	114	54,244	20,718	80,704	13,244	7,445	660	22,612	.....	4,910	48,870	31,834	8,500	23,334	—22,336
Oregon Short Line	2,259	1,335,246	282.916	1,768,220	155,288	236,599	32,093	476,695	28,185	53,175	982,035	786,185	131,600	654,387	317,241
Oregon-Washington R. R. & Nav. Co.	2,046	771,816	262,908	1,147,831	268,784	121,207	39,842	497,488	24,884	58,333	1,005,433	142,398	94,800	47,324	—88,659
Panhandle & Santa Fe	670	316,282	74,378	410,052	55,692	64,781	4,221	110,340	.....	13,036	247,822	162,230	10,573	151,515	97,687
Pennsylvania Company	1,758	3,717,303	898,316	5,146,551	647,416	955,304	76,591	1,902,093	32,444	129,608	3,742,961	1,403,590	274,375	1,129,187	1,029,973
Pennsylvania Railroad	4,541	12,918,373	3,295,659	17,706,237	2,165,726	3,492,695	208,994	6,626,786	234,374	432,497	13,161,073	4,545,165	674,599	3,869,857	2,694,786
Pere Marquette	2,248	1,196,825	300,880	1,677,919	116,119	369,762	29,467	652,833	3,624	45,941	1,217,020	460,898	50,851	409,569	223,444
Philadelphia & Reading	1,120	4,173,407	547,313	4,964,266	267,649	681,570	47,100	1,737,037	15,671	78,479	2,826,041	2,138,225	99,332	2,038,218	1,148,667
Philadelphia, Baltimore & Washington	717	882,816	768,465	1,816,327	255,603	324,988	27,800	753,131	503	51,548	1,413,573	402,754	56,680	346,013	287,078
Pittsburgh & Lake Erie	225	1,504,051	140,793	1,745,351	138,493	257,323	13,092	425,576	3,247	31,558	869,290	876,061	58,700	817,359	691,494
Pittsburgh, Cincinnati, Chic. & St. Louis	1,489	2,711,489	734,889	3,920,590	490,478	713,395	63,897	1,431,903	27,232	96,032	2,822,921	1,097,669	167,939	929,648	578,150
Pittsburgh, Shawmut & Northern	264	206,959	9,288	218,477	29,415	56,211	1,477	72,203	.....	5,686	164,991	53,486	1,831	51,655	5,853
Port Reading	21	177,818	.....	147,375	6,590	14,875	38	100,437	.....	115	122,056	25,319	10,000	15,319	—36,094
Richmond, Fredericksburg & Potomac	88	132,813	105.268	276,617	15,410	28,711	3,772	94,761	3,212	7,348	153,214	123,403	9,000	114,386	54,702
Rutland	468	157,652	84,471	277,859	28,384	57,114	8,400	112,338	957	6,047	213,238	64,621	17,221	47,400	18,457
St. Joseph & Grand Island	258	112,005	24,268	144,394	30,175	18,174	4,323	56,862	.....	5,372	114,907	29,487	7,962	21,510	10,265
St. Louis & San Francisco	4,750	2,456,703	840,051	3,547,025	479,512	617,898	74,428	1,281,992	.....	91,846	2,512,351	1,034,674	172,154	861,218	92,784
St. Louis, Brownsville & Mexico	548	112,184	58,030	187,933	43,106	35,046	5,492	71,299	.....	9,606	158,702	29,231	8,000	21,167	—3,946
St. Louis, Iron Mountain & Southern	3,363	1,941,499	472,881	2,629,137	369,814	500,854	70,608	813,532	11,127	59,495	1,818,580	810,557	117,053	691,885	151,602
St. Louis Merchants' Bridge Terminal	9	.....	286	205,636	27,216	11,362	775	96,892	.....	5,648	141,894	63,743	8,220	55,522	23,244
St. Louis, San Francisco & Texas	244	41,798	21,174	71,605	16,677	16,614	2,008	43,098	.....	4,149	82,548	—10,943	1,555	—12,497	—8,012
St. Louis Southwestern	943	497,578	106,111	644,217	49,960	108,614	31,238	172,416	3,000	25,723	390,866	253,351	29,848	223,470	95,955
St. Louis Southwestern of Texas	811	241,399	68,156	337,380	59,680	82,733	14,611	159,936	1,254	18,563	335,135	2,245	16,788	—14,550	8,250
San Antonio & Aransas Pass	724	172,585	70,118	264,579	69,358	54,154	6,768	141,684	.....	12,560	284,275	—19,697	15,000	—34,743	305
San Pedro, Los Angeles & Salt Lake	1,147	464.963	222,007	766,305	86,194	137,384	31,973	259,886	19,331	19,516	546,851	219,454	44,822	174,573	12,937
Seaboard	3,449	1,422,680	502,980	2,144,800	248,568	300,717	72,727	739,144	15,325	63.836	1,440,316	704,485	96,280	607,120	.....
Southern	7,022	3.705,255	1,362,075	5,588,022	659,468	938,912	174,107	1,920,095	38,388	170,744	3,825,868	1,762,154	250,604	1,510,719	803,994
Southern Pacific	6,952	4,561.335	1,816,767	7,131,689	1,071,656	1,407,583	164,901	2,641,863	153,366	243.753	5,672,534	1,459,155	420,502	1,037,364	—406,032
Spokane, Portland & Seattle	555	200,324	68,722	300,936	33,786	35,775	7,633	92,059	3,059	14,574	186,506	114,430	53,400	60,898	13,615
Staten Island Rapid Transit Co	11	54,917	21,551	107,331	10,144	5,759	657	55,896	.....	3,091	75,547	31,784	5,000	26,783	—6,490
Tennessee Central	294	85,678	26,018	119,437	25,073	19,075	5,858	49,310	.....	6,430	105,740	13,698	4,681	8,991	4,091
Terminal R. R. Association of St. Louis	37	.....	267	267,961	32,586	18,177	854	102,552	.....	3,437	157,606	110,356	34,346	76,010	10,679
Texas & New Orleans	468	212,320	84,034	335,869	70,089	67,865	8,767	136,898	9,565	10,630	303,768	33,101	19,816	13,253	14,574
Texas & Pacific	1,944	1,101,955	325,774	1,558,919	145,881	218,312	39,061	648,159	14,988	64,241	1,129,419	429,501	68,700	360,589	34,078
Toledo & Ohio Central	436	364.601	44,413	431,552	55,102	113,498	7,841	166,209	1,654	9,944	354,249	77,304	23,516	53,788	55,394
Toledo, Peoria & Western	248	52,553	32,317	91,415	13,372	32,552	2,565	36,654	.....	3,726	88,869	2,547	6,500	—3,953	—1,206
Toledo, St. Louis & Western	451	405,759	26,270	459,351	42,253	60,902	17,107	170,540	.....	8,124	298.072	161,279	17,400	143,879	67,076
Ulster & Delaware	129	31,968	10,946	57,880	6,421	9,183	937	28,631	.....	3,542	48,714	9,165	3,500	5,665	20,681
Union Pacific	3,622	3,314,050	716,099	4,487,970	539,312	623,901	98,509	1,267,831	69,985	123,808	2,730,382	1,757,588	210,700	1,545,234	536,212

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JANUARY, 1916—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.	Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Union R. R. of Baltimore	8	119,435	22,192	143,557	11,093	.....	.....	5,083	.....	2,091	18,267	125,290	5,723	119,567	11,008
Union R. R. of Pennsylvania	31	.....	.....	375,766	23,923	99,132	102	161,299	.....	3,419	287,876	87,890	7,000	80,890	191,545
Vandalia	917	724,567	196,260	1,035,905	138,440	194,699	72,599	393,571	10,367	24,059	783,735	252,170	36,141	215,656	151,512
Vicksburg, Shreveport & Pacific	171	83,063	35,600	133,564	16,937	25,559	4,102	45,163	2,006	5,400	98,928	34,636	8,180	26,455	35,967
Virginia & Southwestern	225	137,662	13,801	156,200	24,200	38,526	2,300	43,910	.....	3,803	112,739	43,461	7,517	35,944	6,266
Virginian	504	589,782	33,084	666,976	59,555	111,705	6,245	129,732	14,828	16,499	338,458	328,517	26,500	302,006	104,597
Wabash	2,519	2,177,752	458,501	2,859,284	278,296	450,263	88,307	1,088,679	14,482	62,701	1,981,131	878,153	90,261	787,461	478,142
Washington Southern	36	43,920	59,073	136,951	12,293	17,087	1,298	43,649	1,429	3,316	79,071	57,880	4,200	53,680	32,947
West Jersey & Seashore	358	193,896	228,890	464,428	87,982	87,557	10,769	240,082	2,625	15,643	444,658	19,770	36,358	—16,637	—45,422
Western Maryland	689	783,365	63,784	893,551	103,355	131,146	21,289	315,957	8,077	22,258	602,004	291,547	29,000	262,547	142,081
Western Pacific	941	359,385	40,106	437,249	65,902	47,610	20,085	168,916	9,283	17,835	329,632	107,617	30,118	77,454	82,139
Western Ry. of Alabama	133	62,473	35,820	110,545	16,870	23,024	6,246	30,914	1,751	4,370	83,139	27,406	5,341	21,599	8,821
Wheeling & Lake Erie	512	592,803	47,841	692,324	70,329	127,529	8,370	232,666	1,591	15,182	455,666	236,658	38,817	197,842	219,835
Yazoo & Mississippi Valley	1,382	837,906	222,039	1,119,011	159,517	172,033	19,002	370,756	1,613	29,259	751,913	367,097	50,000	316,795	115,125

SEVEN MONTHS OF FISCAL YEAR 1916

Alabama & Vicksburg	143	$644,783	$252,605	$980,711	$119,239	$208,516	$26,648	$332,817	$15,054	$38,193	$740,444	$240,267	$62,190	$178,077	$115,504
Alabama Great Southern	309	2,277,118	668,061	3,166,641	284,604	753,137	90,311	925,249	21,952	61,991	2,135,500	1,031,141	111,236	919,830	410,344
Ann Arbor	294	1,109,605	338,240	1,546,431	145,821	223,882	33,314	552,936	3,510	74,315	1,033,777	512,654	90,000	422,374	108,810
Arizona Eastern	378	1,373,951	233,529	1,715,640	249,531	165,375	15,969	379,347	7,813	73,907	890,272	825,368	135,165	690,178	389,409
Atchison, Topeka & Santa Fe	8,620	41,236,608	17,135,947	63,930,894	8,587,486	9,665,669	1,401,887	17,256,698	.....	1,340,093	38,116,122	25,814,771	2,997,304	22,798,937	4,651,459
Atlanta & West Point	93	411,997	275,502	793,190	93,633	152,046	41,224	228,431	14,326	31,228	560,725	232,465	41,595	187,379	116,444
* Atlanta, Birmingham & Atlantic	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic & St. Lawrence	167	772,383	173,070	1,028,886	158,607	162,699	26,731	445,849	.....	27,731	821,616	207,270	80,535	126,725	—27,740
Atlantic City	170	519,766	953,474	1,551,303	239,501	134,131	21,974	744,465	700	11,475	1,152,243	399,060	70,000	328,888	101,204
Atlantic Coast Line	4,700	12,539,431	4,479,798	18,483,050	2,536,126	3,186,389	400,800	6,255,092	57,362	508,131	12,929,756	5,553,294	1,020,000	4,523,380	1,419,170
Baltimore & Ohio	4,535	50,873,798	8,928,460	64,484,591	7,289,934	13,378,437	1,135,406	20,652,277	369,866	1,411,831	44,233,713	20,250,879	2,011,713	18,223,217	5,558,993
Baltimore & Ohio Chicago Terminal	79	.....	4,073	997,392	115,144	119,109	6,354	448,785	11,967	49,895	724,770	272,622	123,575	147,587	21,168
Baltimore, Chesapeake & Atlantic	88	427,450	268,177	727,137	51,639	235,794	10,443	384,098	.....	23,119	705,082	22,055	15,669	6,379	—82,439
Bangor & Aroostook	632	1,497,165	397,598	2,019,702	320,993	340,111	19,496	563,750	22,184	78,455	1,344,353	675,350	88,350	586,985	9,996
Belt Ry. Co. of Chicago	31	.....	.....	1,654,368	128,441	195,679	5,018	714,393	.....	42,435	1,085,966	568,402	78,571	489,831	—369,169
Bessemer & Lake Erie	205	6,605,280	233,118	6,958,002	497,440	1,153,935	68,162	1,475,985	.....	107,093	3,237,327	3,720,675	122,638	3,598,018	1,156,242
Bingham & Garfield	27	1,145,999	22,163	1,173,224	113,944	106,835	7,418	152,816	682	15,778	397,474	775,750	31,327	744,423	392,732
Boston & Maine	2,302	17,865,999	9,242,945	29,840,266	3,691,284	3,753,551	245,017	12,274,627	115,641	722,627	20,802,747	9,037,519	1,154,533	7,882,987	2,741,405
Buffalo & Susquehanna R. R. Corporation	253	951,562	48,027	1,014,114	143,570	246,736	7,568	269,896	.....	39,105	706,874	307,239	18,200	289,039	165,461
Buffalo, Rochester & Pittsburgh	586	6,044,876	686,973	6,971,815	1,076,884	575,319	81,671	2,121,695	8,303	153,989	5,017,861	1,953,954	140,000	1,813,909	437,347
Canadian Pacific Lines in Maine	233	701,870	127,685	888,994	153,608	114,053	36,616	372,392	.....	25,250	701,919	187,075	84,000	103,075	152,342
Carolina, Clinchfield & Ohio	283	1,426,639	126,301	1,584,602	157,576	193,125	61,415	273,722	.....	63,801	742,553	842,049	99,750	742,196	204,901
Carolina, Clinchfield & Ohio of S. C.	18	79,332	9,982	91,729	7,974	567	12,168	16,438	.....	5,176	42,148	49,581	5,250	44,331	10,393
Central of Georgia	1,924	4,888,424	1,873,800	7,503,497	962,931	1,224,331	249,038	2,437,381	7,653	269,442	5,145,370	2,358,127	373,149	1,978,892	412,255
Central of New Jersey	681	14,672,612	3,786,074	19,591,204	1,528,069	3,396,497	223,239	6,574,432	95,458	395,677	12,210,675	7,380,528	1,115,938	6,264,094	1,133,765
Central New England	304	2,429,719	274,982	2,825,608	321,116	233,215	8,308	833,903	.....	34,041	1,429,770	1,395,837	89,600	1,306,208	702,598
Central Vermont	411	1,670,725	568,739	2,440,884	288,010	396,267	61,845	1,030,024	14,862	50,831	1,841,837	599,046	109,180	489,842	199,274
Charleston & Western Carolina	343	792,226	208,544	1,059,683	185,693	134,216	22,892	346,337	.....	33,216	722,018	337,665	35,000	302,632	161,224
Chesapeake & Ohio Lines	2,374	22,463,416	3,595,241	27,699,370	3,153,063	5,927,791	366,720	7,849,230	150,826	530,343	17,968,878	9,730,492	885,720	8,835,529	2,960,699
Chicago & Alton	1,052	6,344,113	2,347,698	9,418,061	1,112,548	2,029,657	245,463	3,174,381	68,720	211,494	6,785,252	2,632,809	306,363	2,323,263	542,581
Chicago & Eastern Illinois	1,282	7,494,635	1,757,346	10,024,074	1,330,799	2,344,734	170,143	3,380,853	52,698	269,175	7,530,019	2,494,055	388,500	2,103,306	289,430
Chicago & Erie	270	3,660,872	356,559	4,363,589	405,555	425,818	119,870	1,613,314	15,503	98,165	2,669,207	1,694,382	153,713	1,540,669	748,197
Chicago & North Western	8,108	34,758,745	12,933,395	53,175,337	6,687,999	8,549,766	767,220	18,280,531	376,924	1,075,492	35,584,698	17,590,639	2,695,000	14,884,532	2,259,454
Chicago, Burlington & Quincy	9,368	41,625,538	13,098,113	60,222,870	6,385,846	8,760,525	895,818	17,455,241	480,117	1,158,141	35,135,690	25,087,181	2,517,220	22,569,960	3,311,713
Chicago Great Western	1,427	6,076,122	1,981,372	8,809,766	1,177,252	1,491,264	316,342	3,026,249	59,564	235,449	6,295,323	2,514,443	320,812	2,188,785	294,554
Chicago, Indianapolis & Louisville	622	2,967,415	1,093,104	4,403,411	493,028	710,273	135,726	1,476,590	1,622	129,429	2,942,292	1,461,119	190,935	1,269,877	471,256
Chicago Junction	13	.....	.....	1,321,034	143,859	121,264	7,357	691,738	.....	37,820	1,002,040	318,995	25,862	293,121	104,437
Chicago, Milwaukee & St. Paul	10,076	44,457,332	11,364,954	62,047,782	5,665,655	9,365,750	1,052,116	21,668,172	457,256	1,099,763	38,304,287	23,743,496	3,131,756	20,595,033	5,356,763
Chicago, Peoria & St. Louis	255	788,930	175,640	1,023,010	152,188	194,786	39,671	409,986	.....	37,671	834,302	188,708	32,898	155,811	35,985
Chicago, Rock Island & Pacific	7,663	28,157,040	11,136,182	42,500,411	6,412,686	7,496,706	971,200	15,551,009	329,180	1,088,224	31,809,258	10,691,153	2,068,663	8,619,546	29,222
Chicago, Rock Island & Gulf	477	1,375,046	387,030	1,911,335	284,633	230,354	65,992	635,375	13,030	55,680	1,284,973	626,362	66,703	559,335	70,232
Chicago, St. Paul, Minn. & Omaha	1,753	7,489,161	3,129,238	11,480,189	1,444,407	1,435,162	207,409	4,099,783	108,642	269,481	7,551,061	3,929,128	602,221	3,324,236	262,735
Chicago, Terre Haute & S. E.	374	1,336,506	114,816	1,488,167	187,794	284,029	27,639	427,215	6,492	59,675	992,844	495,323	72,917	422,376	170,448
Cincinnati, Hamilton & Dayton	622	4,989,785	891,877	6,567,045	1,058,423	1,266,657	121,922	2,326,564	23,993	160,309	4,948,066	1,618,978	1,352	1,386,496	725,392
§ Cincinnati, Indianapolis & Western	322	271,720	83,665	387,691	29,910	60,977	8,806	181,753	421	13,003	294,526	93,164	19,320	73,845	.....

* Operations begun January 1, 1916, by reorganization.

§ Figures shown here for two months ended January 31, 1916.

REVENUES AND EXPENSES OF RAILWAYS

SEVEN MONTHS OF FISCAL YEAR 1916—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance of										
		Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Cincinnati, New Orleans & Texas Pacific	337	4,724,358	1,041,114	6,124,030	605,769	1,532,992	173,085	1,773,969	36,553	141,009	4,263,245	1,860,785	220,000	1,640,368	481,612
Cincinnati Northern	246	876,622	130,098	1,051,433	176,570	161,345	18,675	331,931	.....	22,041	710,562	340,872	38,371	302,428	67,691
Cleveland, Cincinnati, Chic. & St. Louis.	2,385	17,322,257	5,380,045	24,804,720	2,674,272	4,524,018	518,976	8,211,464	171,883	522,699	16,559,480	8,245,240	881,131	7,357,315	2,570,880
Colorado Midland	338	761,838	125,610	961,835	152,714	223,571	50,522	400,864	8,394	39,190	875,055	86,781	63,810	22,971	—96,491
Colorado & Southern	1,091	4,013,722	851,410	5,218,305	658,553	996,775	68,005	1,450,079	29,562	162,258	3,365,232	1,853,073	245,000	1,607,814	391,735
Cripple Creek & Colorado Springs	87	668,099	166,141	848,134	114,610	89,225	27,828	209,568	.....	24,132	465,363	382,770	36,663	346,108	.....
Cumberland Valley	164	1,495,536	396,615	1,991,693	214,215	202,059	29,063	603,985	5,915	61,142	1,113,592	878,100	41,231	836,867	390,811
Delaware & Hudson Co. R. R. Dept.	886	10,625,099	1,622,342	12,952,067	1,059,996	1,890,852	161,684	4,001,725	112,085	396,644	7,604,929	5,347,138	306,558	5,038,039	995,155
Delaware, Lackawanna & Western	958	20,775,251	5,146,153	28,629,729	2,730,377	4,133,310	511,583	8,726,403	217,750	560,183	16,842,291	11,787,438	1,198,234	10,588,142	2,234,850
Denver & Rio Grande	2,574	10,827,658	3,282,884	15,237,477	1,668,247	2,472,151	279,989	4,017,344	302,695	353,135	9,093,561	6,143,917	635,000	5,507,821	1,501,014
Denver & Salt Lake	255	966,180	206,846	1,224,797	138,306	220,662	13,746	424,772	.....	32,382	829,757	395,039	54,458	340,419	21,244
Detroit & Mackinac	397	412,580	191,996	653,651	71,820	109,358	13,888	228,281	892	18,875	443,114	210,537	59,449	151,088	25,463
Detroit & Toledo Shore Line	81	950,484	.....	956,110	87,003	55,098	10,512	245,472	.....	18,996	417,081	539,029	39,025	500,004	106,035
Detroit, Grand Haven & Milwaukee	191	1,244,001	369,439	1,871,216	164,242	216,723	37,682	849,951	4,923	29,429	1,302,951	568,265	26,390	541,380	350,930
Detroit, Toledo & Ironton	441	1,077,746	100,940	1,264,046	132,764	171,196	27,729	520,706	.....	42,247	894,641	369,405	39,500	329,871	325,391
Duluth & Iron Range	288	3,700,337	139,235	3,960,855	373,025	494,810	9,416	918,511	8,495	80,171	1,884,428	2,076,427	215,845	1,859,495	892,662
Duluth, South Shore & Atlantic	628	1,308,624	536,625	2,028,174	322,973	239,199	51,351	698,742	26,155	67,139	1,405,559	622,615	152,868	469,614	167,846
Duluth, Winnipeg & Pacific	187	656,031	129,275	815,225	87,529	93,699	11,313	291,687	4,773	40,077	529,079	286,147	40,836	245,310	146,899
Duluth, Missabe & Northern	383	6,442,248	186,054	6,920,415	627,265	776,801	15,652	1,074,431	54,283	98,408	2,646,840	4,273,574	390,657	3,882,918	2,472,972
El Paso & Southwestern Co	1,027	4,494,176	955,487	5,800,427	855,234	775,802	128,318	1,461,390	45,076	205,402	3,471,097	2,329,330	276,340	2,052,688	545,394
Elgin, Joliet & Eastern	779	6,846,992	82	7,312,633	517,529	1,213,052	46,517	1,958,588	.....	160,240	3,895,448	3,417,185	264,014	3,152,981	1,648,528
Erie	1,988	29,189,485	5,551,038	38,170,684	2,849,027	5,595,891	631,552	12,875,649	236,201	787,474	22,912,607	15,258,077	1,134,147	14,088,873	7,249,859
Florida East Coast	745	1,918,402	845,982	3,183,743	454,481	423,887	66,362	1,079,300	20,300	136,455	2,160,192	1,023,551	161,339	861,983	272,804
Fort Worth & Denver City	454	2,426,218	981,849	3,586,259	417,529	566,897	45,428	1,036,673	19,253	109,054	2,194,834	1,391,425	123,746	1,267,679	302,639
Galveston, Harrisburg & San Antonio	1,351	5,204,629	1,875,658	7,481,945	1,055,315	1,012,821	209,091	2,717,588	75,950	226,937	5,287,972	2,193,973	353,937	1,836,149	827,370
Galveston Wharf	13	.....	.....	793,877	34,282	14,526	2,797	218,467	311,064	2,749	583,886	209,992	66,090	143,902	—288,348
Georgia	307	1,228,883	472,393	1,838,312	161,964	292,344	88,617	704,662	675	52,843	1,300,434	537,878	110,199	427,239	161,729
Georgia Southern & Florida	395	836,266	408,760	1,426,371	158,760	243,583	47,813	524,019	186	66,957	1,041,201	385,169	75,381	308,931	144,886
Grand Rapids & Indiana	575	2,007,124	1,018,947	3,294,479	343,178	507,589	75,860	1,282,634	13,597	102,939	2,325,798	968,681	152,537	814,409	139,221
Grand Trunk Western	347	3,589,930	1,035,847	4,955,208	509,657	760,391	110,025	1,747,535	38,971	91,486	3,258,063	1,697,144	230,790	1,465,957	1,121,817
Great Northern	8,102	37,115,303	8,521,067	50,059,461	4,027,693	4,770,544	653,530	12,675,375	520,441	769,915	23,313,924	26,745,537	2,996,570	23,746,619	4,063,869
Gulf & Ship Island	308	839,790	209,360	1,142,605	104,538	185,035	20,609	268,164	1,978	47,912	628,237	514,368	49,588	464,509	221,248
Gulf, Colorado & Santa Fe	1,938	6,984,797	1,938,537	9,435,955	1,901,671	1,388,610	202,874	4,159,823	.....	265,139	7,882,835	1,553,119	440,913	1,109,128	—2,144,421
Hocking Valley	351	3,477,450	523,851	4,319,774	432,237	825,068	58,534	1,236,694	.....	100,902	2,653,436	1,666,338	267,600	1,398,647	396,025
Houston, East & West Texas	191	595,329	202,650	851,823	179,071	125,643	14,200	276,177	4,595	22,618	624,016	227,807	27,636	199,928	90,344
Houston & Texas Central	895	2,891,689	893,833	4,085,179	587,638	610,471	110,231	1,360,901	40,325	131,394	2,836,443	1,248,736	208,818	1,038,487	240,490
Illinois Central	4,767	28,921,175	8,029,538	39,977,020	5,850,149	9,528,383	718,462	12,672,933	210,332	1,016,883	29,927,053	10,049,967	1,996,100	8,041,120	618,600
Indiana Harbor Belt	110	.....	.....	2,223,977	238,099	186,874	19,661	873,004	.....	55,666	1,373,304	850,673	53,132	796,314	273,232
International & Great Northern	1,160	4,045,130	1,104,542	5,565,312	853,213	915,061	143,396	2,169,543	23,572	202,651	4,216,526	1,348,787	238,795	1,108,940	360,645
Kanawha & Michigan	177	1,830,037	221,975	2,104,969	291,734	416,516	22,165	538,374	97	47,734	1,316,620	788,348	92,235	695,779	271,245
Kansas City, Mexico & Orient	738	1,242,047	252,001	1,573,496	394,360	311,114	61,652	643,802	.....	71,720	1,482,649	90,848	86,006	4,821	—272,181
Kansas City Southern	837	4,652,610	890,073	6,107,295	697,049	681,240	194,592	1,907,853	.....	242,618	3,648,585	2,458,710	320,109	2,135,881	310,127
Lake Erie & Western	900	3,342,502	455,890	3,996,830	454,887	743,917	85,819	1,322,908	.....	88,272	2,695,803	1,301,027	166,803	1,133,659	521,278
Lehigh & Hudson River	97	1,068,166	65,920	1,249,312	136,045	156,390	10,658	398,773	.....	29,758	731,625	517,688	31,860	485,888	181,581
Lehigh & New England	296	1,943,625	8,543	2,058,950	263,884	216,165	12,921	486,341	.....	39,661	1,018,572	1,040,377	44,260	996,117	357,869
Lehigh Valley	1,442	23,531,763	2,597,883	27,774,196	3,033,384	5,547,812	585,371	9,658,653	87,970	513,496	19,405,779	8,368,416	994,000	7,372,718	1,181,778
Long Island	397	2,359,563	5,012,532	8,469,149	903,496	866,305	83,184	3,314,718	43,159	222,067	5,432,931	3,036,219	541,810	2,489,785	196,746
Louisiana & Arkansas	279	836,732	111,244	977,456	176,770	160,383	22,486	249,567	.....	28,342	637,547	339,909	52,920	286,780	10,157
Louisiana Ry. & Navigation Co	351	1,076,217	209,974	1,369,646	199,458	193,913	43,891	436,103	.....	34,800	908,165	461,481	66,500	394,892	190,236
Louisiana Western	208	937,369	382,633	1,411,138	184,585	231,630	49,483	378,965	13,174	42,704	900,469	510,669	65,106	445,134	92,121
Louisville & Nashville	5,038	25,299,671	6,640,809	34,306,387	4,851,061	6,150,591	856,977	10,043,515	167,649	726,701	22,707,325	11,599,061	1,338,747	10,246,520	4,031,571
Louisville, Henderson & St. Louis	200	618,050	249,156	916,847	216,440	120,041	36,261	277,544	.....	22,495	672,781	244,066	26,600	217,273	43,185
Maine Central	1,220	4,294,287	2,115,500	6,930,052	981,731	966,518	79,866	2,480,851	33,178	205,960	4,747,088	2,182,964	369,964	1,812,732	311,546
Michigan Central	1,803	14,527,532	6,011,163	23,254,785	2,766,000	3,535,217	435,450	8,002,506	366,953	444,511	15,550,638	7,704,148	933,936	6,766,261	2,474,427
Midland Valley	380	772,924	236,429	1,065,489	193,413	145,794	16,514	341,207	.....	41,402	738,330	327,159	44,086	282,650	113,230
Minneapolis & St. Louis	1,646	4,850,151	1,181,467	6,400,351	677,405	862,818	123,761	2,270,657	556	157,085	4,092,281	2,308,070	254,503	2,051,381	316,425
Minneapolis, St. Paul & Sault Ste. Marie	4,218	15,655,998	4,041,856	21,233,578	1,949,362	2,368,315	377,112	5,957,036	118,309	402,517	11,153,500	10,080,077	976,457	9,103,621	3,114,992
Missouri & North Arkansas	365	447,853	206,231	702,755	197,127	152,529	20,108	247,813	.....	38,026	655,603	47,152	40,554	6,005	99,904
Missouri, Kansas & Texas System	3,865	12,825,215	5,041,170	19,228,363	3,768,508	2,993,368	398,876	6,452,666	111,450	637,308	14,319,586	4,908,777	995,690	3,908,080	—1,637,148
Missouri, Oklahoma & Gulf	334	635,477	141,683	809,330	243,808	165,377	29,613	357,379	780	52,525	845,450	—36,120	39,050	—75,794	—86,512
Missouri, Oklahoma & Gulf Ry. of Texas	125	117,983	2,823	122,364	21,551	14,659	11,899	62,740	.....	8,857	119,707	2,657	1,121	1,536	—16,065
Missouri Pacific	3,931	13,600,920	3,108,448	18,235,088	2,756,181	3,708,118	441,296	6,472,717	69,305	462,327	13,904,387	4,330,701	709,940	3,600,992	—145,815
Mobile & Ohio	1,122	5,686,773	734,309	6,793,724	708,545	1,471,446	249,751	2,373,726	16,392	217,103	5,019,035	1,774,689	222,936	1,550,097	122,703
Monongahela	89	985,428	32,814	1,034,310	125,222	78,900	6,184	214,189	.....	22,124	446,621	587,690	38,855	548,834	.....
Morgan's La. & Texas R. R. & S. S. Co.	405	1,829,696	582,979	2,641,671	395,204	461,157	81,882	942,397	16,280	81,330	1,977,337	664,334	153,863	509,347	—23,343
Nashville, Chattanooga & St. Louis	1,231	5,145,881	1,590,843	7,321,434	797,822	1,361,172	347,210	2,557,205	71,835	243,822	5,377,724	1,943,710	182,000	1,760,342	864,440
Nevada Northern	165	925,411	74,305	1,028,631	127,132	91,370	4,652	193,802	556	33,620	451,132	577,499	49,891	527,590	359,944
New Orleans & North Eastern	204	1,622,426	342,820	2,187,856	242,296	392,539	73,439	676,596	40,579	79,591	1,504,907	682,949	103,698	579,251	200,759

REVENUES AND EXPENSES OF RAILWAYS

SEVEN MONTHS OF FISCAL YEAR 1916—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance of										
		Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
New Orleans, Mobile & Chicago	402	921,084	171,066	1,146,083	169,339	190,400	30,268	351,823	—50	47,929	789,708	356,375	48,069	307,362	86,656
New Orleans Great Northern	285	741,230	189,336	1,029,438	130,469	163,863	19,097	291,170	1,214	44,735	650,547	378,891	23,874	354,726	49,009
New Orleans, Texas & Mexico	286	771,434	168,031	991,125	176,624	159,337	27,207	326,158	.....	68,117	757,444	233,681	10,529	222,618	84,254
New York Central Railroad	6,093	72,573,229	28,877,142	117,734,566	11,468,229	20,448,050	1,669,620	35,595,394	1,636,750	2,532,694	73,350,737	44,383,828	5,003,613	39,367,564	.....
New York, Chicago & St. Louis	569	6,950,829	853,640	8,114,887	599,527	1,312,825	318,714	3,134,931	26,365	148,815	5,541,177	2,573,710	293,440	2,276,573	1,072,841
New York, New Haven & Hartford	2,005	21,463,835	17,533,370	43,826,161	5,095,276	6,304,999	259,125	15,501,562	469,362	980,690	28,559,573	15,266,588	1,665,000	13,598,400	3,804,143
New York, Ontario & Western	568	3,567,641	1,143,242	5,476,599	707,372	843,684	52,839	1,990,399	.....	113,421	3,707,232	1,769,367	149,021	1,620,289	221,269
New York, Philadelphia & Norfolk	112	2,197,169	271,353	2,657,982	240,932	525,060	34,643	983,157	28,810	78,270	1,890,820	767,163	79,562	686,480	298,973
New York, Susquehanna & Western	140	1,458,942	358,278	2,033,641	156,237	208,255	13,368	906,170	.....	41,997	1,325,421	708,220	91,357	616,180	116,537
Norfolk & Western	2,045	28,148,936	3,502,173	32,700,885	3,905,755	5,781,857	391,542	8,132,645	60,943	499,980	18,608,428	14,092,457	1,190,000	12,900,228	5,600,519
Norfolk Southern	908	1,749,317	662,438	2,579,484	335,175	372,057	52,747	888,191	831	122,119	1,771,119	808,365	86,469	720,288	261,155
Northern Pacific	6,495	32,474,866	8,548,936	44,857,355	4,873,688	4,222,864	665,607	11,944,250	592,285	646,351	22,598,785	22,258,570	2,691,783	19,563,881	5,952,405
Northwestern Pacific	507	1,029,326	1,297,647	2,606,902	406,719	282,626	36,875	856,085	.....	54,724	1,624,531	982,372	120,008	862,038	299,619
Oahu Ry. & Land Co	114	567,066	149,145	766,624	72,543	60,610	4,658	167,730	.....	35,097	340,638	425,985	59,611	366,374	—8,005
Oregon Short Line	2,258	10,786,432	2,914,668	14,799,132	1,718,121	1,615,784	255,721	3,253,355	221,186	374.856	7,435,258	7,363,874	954,235	6,406,248	1,769,925
Oregon-Washington R. R. & Nav. Co.	2,030	6,615,845	2,754,149	10,218,410	1,515,007	1,095,923	322,077	3,103,104	102,598	409,039	6,521,350	3,697,060	721,325	2,974,605	142,891
Panhandle & Santa Fe	670	2,342,976	600,736	3,079,852	569,554	457,936	28,632	726,979	.....	73,313	1,853,308	1,226,544	88,323	1,137,712	568,078
Pennsylvania Company	1,758	30,488,597	6,547,758	40,788,007	5,073,445	6,415,112	536,518	12,683,817	224,312	848,842	25,781,549	15,006,458	1,966,076	13,038,136	7,041,834
Pennsylvania Railroad	4,541	90,946,895	24,391,811	126,175,403	15,572,022	23,317,335	1,357,753	42,707,793	1,615,704	2,975,203	87,545,809	38,629,593	4,447,160	34,147,825	12,571,441
Pere Marquette	2,254	8,503,248	2,566,110	12,208,337	1,108,221	2,316,000	212,021	4,166,277	29,324	290.515	8,118,886	4,089,451	331,178	3,751,827	1,181,394
Philadelphia & Reading	1,120	27,260,119	3,988,143	32,779,691	2,384,950	5,078,503	331,192	10,666,292	89,105	532,286	19,072,997	13,706,694	702,007	13,000,903	4,730,679
Philadelphia, Baltimore & Washington	717	6,951,390	5,225,616	13,410,848	1,844,195	2,361,596	181,839	5,048,291	627	351,384	9,787,931	3,622,917	379,563	3,241,494	1,340,939
Pittsburgh & Lake Erie	225	11,137,458	1,043,735	12,903,474	950,031	1,748,591	95,791	2,632,726	23,449	199,660	5,650,248	7,253,226	355,622	6,897,561	4,506,373
Pittsburgh, Cincinnati, Chic. & St. Louis	1,489	18,717,125	5,239,214	26,926,670	3,778,267	4,754,735	453,413	8,888,417	183,344	620,856	18,679,016	8,247,653	1,151,090	7,094,598	2,489,710
Pittsburgh, Shawmut & Northern	294	1,338,637	67,094	1,425,566	208,215	332,272	11,046	407,296	.....	33,669	992,499	433,067	13,153	419,914	241,668
Port Reading	21	942,244	.....	1,075,108	64,388	82,249	269	394,270	.....	1,284	542,455	532,653	70,000	462,653	126,123
Richmond, Fredericksburg & Potomac	88	887,019	584,688	1,698,466	129,489	205,552	24,686	582,734	20,550	51,202	1,014,213	684,253	57,244	626,780	175,663
Rutland	468	1,170,363	748,905	2,194,106	273,221	347,449	64,419	749,400	7,388	41,438	1,483,315	710,791	118,762	592,021	164,900
St. Joseph & Grand Island	258	786.497	186,782	1,036,711	204,878	153,449	30,400	346,126	.....	40,641	775,493	261,217	57,632	203,455	26,258
St. Louis & San Francisco	4,750	18,290,088	6,547,848	26,488,408	4,008,513	4,055,783	457,335	8,398,830	.....	648,177	17,383,574	9,104,834	1,217,388	7,875,027	1,038,829
St. Louis, Brownsville & Mexico	548	979,688	451,359	1,550,926	275,811	207,714	37,533	483,045	.....	70,618	1,057,294	493,632	63,389	428,408	163,861
St. Louis, Iron Mountain & Southern	3,363	14,436,256	3,416,957	19,226,893	2,873,729	3,758,345	419,988	5,381,218	55,787	425,253	12,897,227	6,329,666	782,814	5,523,940	659,791
St. Louis Merchants' Bridge Terminal	9	.....	1,578	1,271,656	159,703	55,803	5,461	565,253	.....	46,636	832,856	438,801	65,575	373,215	129,579
St. Louis, San Francisco & Texas	244	447,196	167.253	679,768	156,964	110,177	13,961	295,826	.....	31,326	608,254	71,515	13,039	58,309	—5,317
St. Louis Southwestern	943	3,567,048	816,004	4,668,210	344,357	704,798	195,028	1,117,215	23,809	176,262	2,558,179	2,110,031	209,630	1,898,680	734,588
St. Louis Southwestern of Texas	811	1,823,799	580,439	2,594,166	396,564	546,595	93,662	1,032,558	5,515	125,491	2,140,397	453,770	126,882	326,288	510,861
San Antonio & Aransas Pass	724	1,773,336	621,047	2,559,413	466,786	393,343	45,866	1,044,123	.....	85.045	2,034,360	525,053	129,104	395,650	229,944
San Pedro, Los Angeles & Salt Lake	1,138	3,708,542	1,964,833	6,300,953	578,486	928,236	225,541	1,823,754	166,204	123,402	3,823,961	2,476,991	345,888	2,130,496	682,214
‡ Seaboard	3,449	2,971,481	1,008,225	4,422,909	495,011	598,935	140,341	1,467,433	25,724	133,511	2,860,955	1,561,953	192,527	1,368,037	.....
Southern	7,022	26,469,937	9,957,694	39,964,815	4,787,081	6,332,397	1,106,284	13,201,924	215,215	1,183,092	26,529,559	13,435,256	1,649,452	11,770,109	4,119,604
Southern Pacific	6,936	40,857,992	21,182,436	68,479,036	7,571,443	9,571,836	1,309,859	20,550,576	1,316,837	1,618,354	41,826,566	26,652,470	2,915,612	23,728,362	5,365,515
Spokane, Portland & Seattle	555	1,767,754	933,195	2,968,539	274,960	242,867	56,748	653,087	25,877	89,464	1,339,707	1,628,831	373,800	1,254,315	195,315
Staten Island Rapid Transit Co	11	324,646	186,590	724,105	68,480	38,592	5,155	284,847	.....	18.520	415,595	308,510	35.000	273,508	—13,940
Tennessee Central	294	649,860	229,459	935,305	195,414	126,035	40,219	348,434	.....	46,038	756,066	179,239	33,021	145,741	59,729
Terminal R. R. Association of St. Louis	37	.....	1,660	1,737,795	185,465	98,072	6,250	567,249	.....	34,884	891,921	845,874	187,801	658,063	80,035
Texas & New Orleans	468	1,733,341	635,391	2,613,600	400,379	550,910	56,182	909,943	67,042	71,024	2,055,016	558,584	143,119	1,481	413,983
Texas & Pacific	1,944	8,159,673	2,633,386	11,645,090	1,274,220	1,722,171	265,071	4,399,188	94,428	318,295	8,061,346	3,583,745	570,338	3,010,755	446,159
Toledo & Ohio Central	436	2,525,373	363,753	3,081,841	382,408	607,977	48,631	1,061,565	12,800	68,660	2,182,041	899,800	169,185	730,362	40,565
Toledo, Peoria & Western	248	411,027	274,602	732,787	113,685	201,946	15,682	269,927	.....	25,943	627,183	105,605	41,500	64,105	34,161
Toledo, St. Louis & Western	451	2,828,426	229,697	3,253,984	405,497	485,944	114,399	1,055,919	.....	59,799	2,120,704	1,133,279	124,942	1,008,337	479,976
Ulster & Delaware	129	321,217	215,926	650,411	76,340	70,403	9,523	258,281	338	20,846	435,730	218,680	24,500	189,744	113,213
Union Pacific	3,618	26,188,945	6,661,514	36,406,508	4,574,797	4,486,560	811,493	8,637,810	600,585	854,481	19,944,309	16,462,198	1,449,831	15,007,207	1,827,410
Union R. D. of Baltimore	8	827,606	154,172	994,258	122,869	.....	.....	32,732	.....	15,134	170,735	823,523	36,044	787,479	18,139
Union R. R. of Pennsylvania	31	.....	.....	3,279,012	249,718	654,501	737	1,128,589	.....	32,035	2,065,580	1,213,432	52,104	1,161,328	1,020,583
Vandalia	917	5,041,753	1,443,985	7,305,177	1,051,286	1,308,744	162,568	2,493,598	69,339	175,240	5,260,774	2,044,404	261,666	1,781,613	550,338
Vicksburg, Shreveport & Pacific	171	586,629	281,990	966,419	154,102	179,538	24,767	297,245	14,690	35,730	705,834	260,585	57,421	203,164	152,922
Virginia & Southwestern	236	1,007.242	102.511	1,145,358	171,977	253,401	14,767	309,208	.....	28,315	777,667	367,691	47,764	319,926	41,101
Virginian	504	3,523,474	266,648	4,040,872	441,673	705,031	37,615	813,435	84,903	106,261	2,174,233	1,866,639	152,000	1,714,560	435,636
Wabash	2,519	14,309,511	3,336,609	19,737,156	2,328,861	3,037,746	582,831	7,125,653	109,141	454,054	13,619,604	6,117,552	575,334	5,538,935	1,886,297
Washington Southern	36	299,810	330.013	827,396	100,153	95,212	9,569	271,167	9.050	22,457	507,608	319,789	25,751	294,026	145,671
West Jersey & Seashore	358	1,507,025	2,752,593	4,628,691	770,449	633,084	86,710	1,743,302	20,022	106,222	3,359,790	1,268,901	283,892	984,717	221,774
Western Maryland	667	5,435,702	583,593	6,298,889	743,192	990,383	151,483	2,046,024	37.810	139,300	4,104,506	2,194,383	193,000	2,001,383	936,277
Western Pacific	941	2,733,656	1,314,239	4,385,965	623,672	438,987	159,393	1,336,894	119,792	129,300	2,808,039	1,577,926	193,934	1,382,856	905,922
Western Ry. of Alabama	133	442,256	248,568	772,016	119,189	155,110	41,083	212,048	12,298	31,923	571,245	200.771	38,765	158,713	81,904
Wheeling & Lake Erie	512	4,349,221	377,451	5,095,966	660,791	804,041	58,178	1,483,057	12,219	101.209	3,119,496	1,976,470	246.579	1,729,885	1,115,312
Yazoo & Mississippi Valley	1,382	6,297,520	1,494,784	8,171,751	1,149,649	1,217,073	125,216	2,471,600	10.287	194,204	5,165,966	3,005,786	350,000	2,654,258	941,723

‡ Figures shown here are for two months ended January 31, 1916.

Traffic News

The Erie canal is to be opened May 15.

The Traffic Club of St. Louis has elected the following officers: President, H. M. Adams, general traffic manager Missouri Pacific; secretary, W. S. Crilly; treasurer, M. E. Markman.

The Chicago, Burlington & Quincy is this week running a "good roads" special train through the state of Iowa, from which lectures and demonsrations of road building machinery and methods will be given.

Beginning May 1 all one-way tickets, local, on the New York, Chicago & St. Louis will be good for one year, and local round-trip tickets for the same time. Hitherto one-way tickets have been good only for one day beyond the date of sale, and round-trip tickets for only 30 days.

The Steamer Pleiades last week cleared from the Southern Railway's new export coal terminal at Charleston, S. C., for Buenos Ayres, loaded with five thousand tons of Clinchfield coal, the first cargo of export coal to clear for South American consumption through this port. A number of cargoes have been sent to Cuba, and one for Galveston, Texas.

The Grand Trunk announces that the boats of its lake line to Milwaukee and Chicago will run this season as usual, and that tariffs have been prepared to go into effect at once. The Interstate Commerce Commission has granted the company's application for a rehearing of the case in which a decision had been rendered forbidding the railway company to retain its control of the steamship line.

The Kellum Coffee & Manufacturing Company, of Kansas City, Mo., which was indicted by the Federal grand jury at Kansas City last year on ten counts, for misbilling shipments of nickel-plated coffee urns or percolators, on information obtained by the Interstate Commerce Commission, pleaded guilty in the United States District Court on April 10, and Judge Vanvalkenburgh imposed a fine of $25 on each count, with costs.

In pursuance of an order issued by Judge Carpenter, of the United States court at Chicago, who is in charge of the receivership of the Chicago, Rock Island & Pacific, three passenger trains will be taken out of service on April 15, one between Omaha, Neb., and Rock Island, Ill., one between Des Moines, Iowa, and Davenport, and one between Davenport, Iowa, and Chicago. One train each way between Davenport, Iowa, and Peoria, Ill., will also be taken off later, it was announced.

The Chicago & North Western has announced that during this month it will run a special train through 11 counties in northern Wisconsin for the purpose of demonstrating methods of clearing land of stumps. The train will be operated in co-operation with the Wisconsin College of Agriculture. On the train will be men thoroughly familiar with the method of land clearing to be shown, and demonstrators will give lectures on the use of machines for pulling and piling stumps, including gasoline hoists and hand pullers.

It is understood that the Panama Canal will be open for ships drawing 30 ft. of water on Saturday, April 15; although for some time there may be temporary delays due to the necessity of giving the dredges uninterrupted possession of the right of way for brief periods of time in connection with their work of completing the channel to its full width and depth. A number of vessels are already waiting to go through the canal. During the past few months the Panama Railroad has been overwhelmed with freight, and embargoes have had to be placed on some kinds of traffic.

A petition has been presented to the Georgia Railroad Commission by railroads in that State asking the commission to make a general revision of intrastate freight rates, to put them in consonance with the Interstate Commerce Commission's long and short haul order and with changes which have been made in the Southern classification. The revision requested would increase class rates up to 130 miles and decrease rates beyond that distance. The lines involved are the Atlantic Coast Line, the Atlanta, Birmingham & Atlantic, the Central of Georgia, the Georgia, Southern & Florida, the Seaboard Air Line and the Southern. The petition was filed shortly after the decision of the Tennessee commission on these points, in which the general proposition of the carriers was approved.

The freight station of the New York State Railways at Lafayette street, Utica, which is a transfer station or clearing house for merchandise to and from all of the lines of that company centering in Utica, handles about 100 tons of freight daily. Wholesale merchants and manufacturing houses make constant use of the electric freight cars. Four cars are sent to Little Falls every week day, three to Rome, two to Syracuse, one to Clinton and one to Oneonta. Twenty men are regularly employed at the freight house, and work is carried on both day and night. The railway company also has in service in Utica fifty delivery teams. The snowstorms which prevailed early in March were among the most severe that have been experienced in central New York for a number of years, but all these freight cars continued to make their regular trips, with the exception of only two trips. The New York State Railways carry freight under three tariffs of rates, known as A, B and C. The first tariff provides for wagon service both at the point of shipment and of destination; the second, B, affords wagon service at destination only, and the third provides no wagon service at all. Class B service is most used.

The Eastern Freight Accumulation Conference announces that embargoes are being rapidly modified and in some cases removed, except on export freight. Shipments from the railroads to coastwise steamship lines at New York City are now moving normally. The New Haven road will begin on April 15 receiving substantially all shipments except export freight, and except goods destined for Naugatuck, Waterbury, Waterville, Torrington, Bristol, New Britain and Hartford; cotton to Fall River, and shipments to a few individual industries. The embargo on coal, lumber and cement, however, will be lifted only to the extent of receiving from connecting lines quantities equal to one-third the average daily receipts from each connecting line during the month of April last year. E. E. Clark, Interstate Commerce Commissioner, announcing the action of the conference, again urges all interested to make shipments only where there is pressing necessity, and to load cars to their full capacity. The total number of cars on the New Haven tracks April 8, was 46,883, a decrease since March 16 of 4,945 cars. The opening of freight stations at New York City in the evening had no appreciable effect on the congestion of freight; the merchants did not avail themselves of the evening privilege. The Lehigh Valley opened its station on Sunday, April 9, but this accommodation also remained unused.

Agriculture in the South

The Agricultural Division of the Southern Railway during 1915, by personal visits to farmers and by talks at farmers' meetings, gave advice as to farm methods to approximately 150,000 farmers. Demonstration work was done on a large number of farms all along the company's lines, the greater part of it with cotton and corn. The reports of production on these farms show an average yield of 1,170 pounds of cotton per acre, compared with averages ranging from 591 to 741 pounds on similar lands in the same localities where the improved methods were not adopted. Reports on corn show an average production of 46.7 bushels per acre as compared with 22 bushels on similar lands in the same localities.

Advice was given as to crops of all kinds and especially to the growing of legumes and the planting of winter cover crops. Seed selection was encouraged and many farmers were assisted in breeding improved seeds. The importance of drainage was emphasized and assistance was given in tile drainage, ditching and terracing.

With the rapid progress being made in the eradication of the cattle tick and the control of hog cholera in the South, farmers are turning their attention to better live stock. There have been located along the Southern's lines during the year 2,743 pure-bred beef cattle, 3,250 dairy cattle and 6,038 hogs. About 900 silos were built along the lines of the Southern during the year. The efficiency of the work has been due in large measure to the close co-operation between the agents of the railroad and those of the State and Federal governments.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The National Confectioners' Association and a large number of candy manufacturers have filed a petition with the Interstate Commerce Commission asking a general readjustment of their rates between eastern points and all points west of the Mississippi river, to be brought about by changes in the classification ratings. They also ask reparation for the difference between the old rates and new rates which may be established by the commission.

The Interstate Commerce Commission has announced that, owing to the absence of water competition on transcontinental business, due to the closing of the Panama Canal, a hearing will be held on April 24 at Washington to consider petitions filed by the Spokane, Wash., Merchants' Association and the Nevada Railroad Commission, asking the commission to reopen the entire transcontinental rate case. The petitioners assert that, inasmuch as the canal is closed and the European war has removed from service a large number of ships ordinarily used in the coast to coast trade, that water competition does not in effect exist between the Atlantic and Pacific coasts. They ask, therefore, that the discriminations against the intermountain territory be removed, and that the rates to intermountain territory be placed on a parity with those to the Pacific coast.

Iron and Steel from Pacific Coast Points

Opinion by Commissioner Clements:

Proposed increased interstate rates on certain iron and steel articles from north Pacific coast points to points in Oregon, Washington and Idaho are found not justified. (38 I. C. C. 545.)

Potatoes From Points on the Cape Charles Railroad

John L. Scott v. Cape Charles Railroad et al. Opinion by Commissioner Meyer:

Rates on potatoes from points in Virginia on the Cape Charles Railroad to Philadelphia and New York are found unreasonable and discriminatory to the extent that they exceed the rates from Cape Charles, Va., by more than 4 cents per standard barrel. Reparation denied. (38 I. C. C., 467.)

Coal From Mohrland and Hiawatha, Utah

Consolidated Fuel Company et al. v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Daniels:

Rates on soft coal in carloads from Mohrland and Hiawatha, Utah, points on the Utah Railway, operated by the Denver & Rio Grande under lease, to points in California on the Santa Fe's branch line from Los Angeles, Cal., to National City, Cal., are found unreasonable. A maximum joint through rate of $6.65 a net ton is prescribed for the future. (38 I. C. C., 474.)

L. C. L. Shipments of Perishable Commodities at St. Louis

M. Longo Fruit Company et al. v. Illinois Traction System et al. Opinion by the commission:

The rules and practices relating to the transportation of less-than-carload shipments of perishable commodities from St. Louis, Mo., and East St. Louis, Ill., to contiguous territory, are not found unreasonable or discriminatory. The rules involved provide that l. c. l. shipments of perishable freight weighing less than 15,000 lb. will be forwarded in box cars, when no regular refrigeration service is available, at rates lawfully in effect, at owner's risk, the bills of lading to bear an indorsement signed by shipper and agent reading "to be forwarded at owner's risk of damage by heat and cold." (38 I. C. C., 487.)

Complaint Dismissed

E. J. Johnson v. Atchison, Topeka & Santa Fe. Opinion by the commission:

Defendant's rule under which tickets for transportation on the "California Limited" train from Chicago, Ill., to Albuquerque, N. Mex., were not honored, and the assessment of charges for transportation on this train from Chicago to Albuquerque on the basis of the fare from Chicago to Williams, Ariz., the first point west of Albuquerque to which tickets were honored on this train, are not found to have been discriminatory.

Commissioners Daniels and Hall dissent. (38 I. C. C. 294.)

The Muncie & Western Railroad

In the matter of the Muncie & Western Railroad. Opinion by Commissioner Meyer:

In its original report in this case (30 I. C. C. 434), decided May 5, 1914, the commission held that the Muncie & Western was the private plant facility of the Ball Brothers Glass Manufacturing Company and that the allowance to it of a switching charge by connecting carriers was unlawful.

After the original report was issued, the Supreme Court rendered its decision in *The Tap Line Cases,* 234 U. S., 1, in which it held, "It is the right of the public to use the road's facilities and to demand service of it rather than the extent of its business, which is the real criterion determinative of its character."

Applying this rule to the situation in hand, it is apparent that a duty rests upon the commission to modify its findings in the original report herein. Upon a consideration of all the facts of record, it finds that the Muncie & Western is a common carrier, with which connecting lines may participate in joint rates or to which they may make allowances for switching services.

It holds, further, that the refusal of the trunk lines serving Muncie to absorb the switching charges of the Muncie & Western to and from Ball Brothers and Gill Brothers while absorbing the switching charges of the Muncie Belt and the Lake Erie Belt to and from the same industries is discriminatory, in contravention of section 3 of the act. (38 I. C. C. 510.)

Cottonseed Products to Port Arthur, Tex.

Opinion by Commissioner Clements:

By tariffs, effective June 24, 1915, which were allowed to become effective, the carriers proposed an increase of one cent per 100 lb. in the rates on cottonseed cake and meal from Texas points to Port Arthur, Tex., for export. The Texarkana & Fort Smith and the Kansas City Southern, however, published an item in the tariff naming these increased rates, to the effect that the increased rates would not apply via their lines, although for many years these carriers had been participants in the canceled rates from Texas points. The commission finds that the two carriers have offered no justification for their refusal to participate in the new rates.

It is further held that the increased rates on cottonseed oil and cake from points in Texas to Port Arthur for export have not been justified. The maintenance of a rate of 18½ cents from Texas points, which includes at Galveston and other ports a wharfage charge of one cent and which does not include such wharfage charge at Port Arthur, results in discrimination against Port Arthur. So long as there shall be maintained at Port Arthur no charge for wharfage on foreign shipments the defendants will be required to maintain rates on foreign shipments of cottonseed cake and meal, in carloads, from points in Texas to Port Arthur which shall not exceed the rates to Beaumont by amounts greater than the rates to Galveston for ship-side delivery exceed the rates to Houston. (38 I. C. C., 378.)

Rates on Paper from Points in Michigan

Michigan Paper Mills Traffic Association et al v. Alabama & Vicksburg et al. Opinion by Commissioner Meyer:

The complainants are associations composed of manufacturers of printing, writing, tissue and wrapping paper operating several mills at Kalamazoo, Plainville, Otsego and Vicksburg, Mich. They allege that the rates on paper from their mills to points in central freight association territory and certain other destinations are unreasonable and discriminatory, particularly as compared with the rates from Wisconsin.

The commission's findings are as follows:

The evidence fails to show that the rates to Chicago, to Illinois territory generally, to western trunk line territory, or to trans-Missouri territory are unreasonable or prejudicial.

Rates from complainants' mills to Oklahoma City, Okla., now 2 cents per 100 lb. higher than the combination on Chicago or

St. Louis, should be corrected so as not to exceed such combinations.

Rates to New Orleans, La., are found to be discriminatory and should be readjusted.

Joint rates from Wisconsin mills to Nashville, Tenn., should be canceled, allowing the traffic to move on the Ohio river combination.

The readjustment of rates on paper from New England and northern New York, approved in *Official Classification Rates on Paper*, 38 I. C. C., 120, seems to require a readjustment of rates from Wisconsin mills to central freight association points, which should be made promptly.

Less-than-carload rates from complainants' mills are not found unreasonable or prejudicial. (38 I. C. C. 517.)

STATE COMMISSIONS

C. M. Candler, chairman of the Georgia Railroad Commission, has invited the commissioners of eight other states in the south to join in a conference at Atlanta, Ga., on May 10 to discuss the revision of intrastate rates on freight, which question, by the action of numerous railroad companies, is now or soon will be before the commissions of all the southern states. The states invited are North Carolina, South Carolina, Florida, Tennessee, Alabama, Mississippi, Virginia and Kentucky.

The Railroad Commission of Florida, according to a recent decision of the Supreme Court of that state, has no authority over a terminal company to require the construction of a union station. An order had been issued calling for the building of a station by the Jacksonville Terminal Company; but the terminal company, appealing to the court, secured the annulment of the order. The Terminal Company objected to the location fixed by the commissioners. It has plans made for the construction of an elaborate terminal on the site of the present station, and work will be commenced at once.

PERSONNEL OF COMMISSIONS

Clyde B. Aitchison has resigned as chairman of the Public Service Commission of Oregon, and has been appointed solicitor for the National Association of Railway Commissioners, to represent the state commissions in connection with the valuation of railroads being made by the Interstate Commerce Commission. He will have headquarters at Washington, D. C. Mr. Aitchison has been a member of the Oregon commission since 1907. Previous to his appointment on the railroad commission he was, in 1905 and 1906, secretary of the Oregon Tax Commission, appointed to redraft the tax laws of the state.

UNITED STATES SUPREME COURT

False Representations as to Weight by Consignee is Criminal

The Supreme Court of the United States holds that the provisions of the act to regulate commerce and its amendments as to false billing, classification weighing, etc., apply to consignees as well as to consignors. The South Georgia transported from Baden to Greenville for a manufacturing company (in this case both consignor and consignee) a carload of timber, which was not weighed. The consignee ascertained the number of feet, and falsely and fraudulently represented that the number of feet was 7,200, instead of 9,074, in consequence of which the railroad charged and was paid less than the lawful charge. The consignee and its agent were indicted. They insisted that since the indictment showed that the transportation had been completed and the lumber delivered to the consignee before the alleged fraudulent representations were made, it could not be said that the fraud charged amounted to either obtaining or attempting to obtain transportation for the property at less than the established rates. This contention was not sustained. The statutory provision is not designed specially to protect the property rights of the carrier, for the offense is made equally punishable whether committed with or without the consent or connivance of the carrier. The law is but one of many provisions enacted by Congress with the object of preventing discrimination as between shippers. The court said: "In a case where for any reason the payment of the freight is not made prior to the delivery of the goods to the consignee, but remains to be afterwards adjusted, the effort to obtain an advantage not permitted by the tariffs may still be exerted through fraudulent representations influencing the adjustment of the freight, with precisely the same effect as if the representations had preceded delivery of the goods. When this is accomplished, there is a fraudulent obtaining of transportation at less than the established rate, within the meaning of the prohibition."—United States v. Union Mfg. Co. Decided April 3, 1916.

Railroad's Paramount Right to Right of Way

The Supreme Court of the United States holds, in a suit by the Northern Pacific to quiet title to its right of way across a quarter section, that where a settler holding a patent from the United States has settled on the land two months after the grading of a railroad across it had been completed, but a few days before the rails were laid on the grade, the railroad has the paramount right to its right of way. The court adopted the following language of the State Supreme Court: "It would be absurd to hold that one who enters upon land and sees upon it a railroad grade, which is only 18 days from physical completion, and, as we have a right to believe, but a link in miles of road stretching across the same prairie, was not aware of this prior railroad occupation."—Barlow v. Northern Pacific. Decided April 3, 1916.

State Regulation of Size of Switching Crews

The Supreme Court of the United States holds to be constitutional and valid an act of the State of Arkansas providing that switching crews, switching cars over public crossings within the city limits of cities of the first and second class must have at least one engineman, a fireman, a foreman and three helpers, notwithstanding that companies operating railroads less than 100 miles long are exempt from the law. The St. Louis, Iron Mountain & Southern, which had violated the statute for one day in the city of Hot Springs, and had been sentenced to pay the minimum fine of $50 imposed by the statute, unsuccessfully objected that certain terminal companies, one at Helena, and one at Fort Smith, do switching for certain connecting trunk lines, and yet, by reason of their length being less than 100 miles, are not subject to the act. The one at Fort Smith does switching over some of the same crossings as the defendant.—St. Louis, I. M. & S. v. State. Decided April 3, 1916.

COURT NEWS

Refusal to Receive Stock in Infected Stockyard

The Alabama Court of Appeals holds that a railroad can decline to accept a shipment of live stock by showing that, at the time of tender of the shipment, its stockyard, where, by federal statute, it is required to unload stock for resting, is infected with a contagious disease (in this instance pleuro-pneumonia), which condition the railroad has not had reasonable time to remedy.—N. C. & St. L. v. Farrell & Braley (Ala.), 70 So., 986.

Crossing Watchmen—"All During the Day"

An ordinance of the city of Waxahachie, Texas., required all railroads running trains through the city to keep a watchman at each crossing, who should remain there "all during the day," that is, the whole 24 hours. The Texas Court of Civil Appeals holds that the ordinance is void, as unreasonable on its face; the court taking judicial notice of the fact that trains do not run at all times on any railroad in the state.—Waxahachie v. M. K. & T. (Tex.), 183 S. W., 61.

Crossing Accident—Contributory Negligence

A person undertook to cross in front of a train approaching a street crossing, when he thought it was about 50 yards away, and then tried to step back. In an action for injuries sustained by him, the Florida Supreme Court held that it was immaterial that the whistle was not blown, or that the bell was not rung, or that the headlight was not brilliant; the plaintiff saw the approaching train, knew of the danger, and was chargeable with the exercise of the prudence and caution which the known dangers of the situation required, and all the circumstances de-

manded. Judgment for the plaintiff was therefore reversed.—L. & N. (Fla.), 70 So., 998.

Mississippi Privilege Tax on Railroads Held Invalid

The federal district court, S. D. Mississippi, holds that the privilege tax imposed on railroad companies by the Mississippi statute of 1912 is not invalid, as an additional property tax, because the amount is determined by the mileage of the road within the state, and its gross earnings, in accordance with which the roads are classified for the purpose of fixing the rate; but, inasmuch as it prohibits under penalty and without exception the operation of a railroad in the state for any purpose without first paying the tax and obtaining a license, it is unconstitutional and void, as imposing a tax on interstate commerce and on the doing of government business.—Illinois Central v. Mississippi Railroad Commission, 229 Fed., 248.

Rest, Water and Feeding Act—Foreign Shipment Passing Through United States

In an action for penalties under the rest, water and feeding act, the United States Circuit Court of Appeals, Seventh Circuit, holds that where a shipment of horses from a point in Ontario, Canada, to a point in British Columbia, passing through Michigan and Illinois en route, was confined in excess of 28 hours while being transported from a point in Michigan into and through the state of Illinois to a point therein where the animals were unloaded, the violation of the time regulation constituted a violation of the statute, the point of origin of the shipment and its final destination not being material.—Grand Trunk v. United States, C. C. A., 229 Fed., 116.

Proximity of Posts to Tracks in Private Yards Causing Injury

The Wabash had, at Decatur, Ill., a track leading into a manufacturing plant, and near the track at the entrance to the plant and on the premises stood a post. A switchman, while riding on the side of a train, was knocked off by the post, sustaining injuries from which he died. The railroad had elected not to be governed by the Illinois Workmen's Compensation Act and an action was brought against its receivers at common law. The Illinois Supreme Court holds that a railroad company is guilty of actionable negligence to its employees in operating a train upon its own track or one belonging to another road past an obstruction located dangerously near the track if it knew, or by the exercise of ordinary care could have known, of the dangerous obstruction; and this rule applies where the obstruction is alongside the track on the premises of a manufacturing plant. The defendants contended that the manufacturing company built the entrance gate and owned the tracks in the plant, and that the railroad or its receivers could not move or change the gate—that this duty rested only on the factory officers. It was held that the railroad could require the owners of the plant to remove the post, or refuse, until the change, to do switching. The post had been in the same position for a year and a half; it was, therefore, held the railroad was chargeable with knowledge of its dangerous proximity to the track.

The defendants also contended that they had warned the deceased of the proximity of the post to the track by a non-clearance list, which the deceased receipted for when he was employed. It included the following: "South side of track on north side of starch works, Decatur." There was a track outside of the yards on their north side, and the plaintiff claimed this was the track referred to. In any event, the court held it was a question for the jury as to whether giving this list to the deceased was a sufficient discharge of the defendants' duty to warn him of the dangerous proximity of the post.

It was also held that the order of the Federal District Court for the eastern district of Missouri appointing receivers for the road gave the receivers authority to reject the Workmen's Compensation Act in the southern district of Illinois, without obtaining a special order of court for that purpose, since a court in a principal railroad receivership has general authority over the entire system, even as to parts not within the district in which the court sits, while the authority of the receivers under the order, to operate the road as the company might have done, was ample. Judgment for the plaintiff was affirmed.—Devine v. Delano (Ill.), 111 N. E. 742.

Railway Officers

Executive, Financial, Legal and Accounting

R. C. Kerens, vice-president of the Coal & Coke at Elkins, W. Va., has been elected president, succeeding Henry G. Davis, deceased. Arthur Lee, second vice-president and treasurer at Elkins, has been elected vice-president, and C. M. Hendley, secretary, at Washington D. C., has also been elected treasurer.

Louis P. Ecker, auditor of the Kanawha & Michigan, has been appointed also auditor of the Toledo & Ohio Central and the Zanesville & Western. Jesse B. Wagner, auditor of the Zanesville & Western and the Toledo & Ohio Central, has been appointed assistant auditor of all three of the aforementioned lines.

Operating

George Hodges, secretary and treasurer of the Special Committee on Relations of Railway Operation to Legislation, has been elected chairman of the Committee on Relations between Railroads of the American Railway Association, to succeed Arthur Hale, when the latter's resignation becomes effective on May 18. He will have headquarters as at present in Chicago. Mr. Hodges graduated from St. Paul's School at Concord, N. H., and entered railway service in 1886 with the Erie. He remained with that company until 1903, when he entered the service of the Baltimore & Ohio. In 1908 he was appointed assistant agent for the receivers of the Seaboard Air Line. At the expiration of the receivership in 1910 he took up the work of the Special Committee on Relations of Railway Operation to Legislation, which was then under the chairmanship of the late F. O. Melcher, vice-president of the Chicago, Rock Island & Pacific, and in 1912 he became secretary and treasurer of that committee, and also assistant general agent of the American Railway Association, with headquarters in Chicago. He has therefore been closely associated with the important work of the Special Committee since its inception, and he will continue to perform his duties in connection with that committee, in addition to those of his new office of chairman of the Committee on Relations between Railroads. By his election Mr. Hodges also becomes the chairman of the Per Diem Rules Arbitration Committee and chairman of the American Railway Association committees on Weighing and on the Marking, Packing and Handling of Freight.

G. Hodges

R. E. Orr has been appointed acting trainmaster of the Grand Trunk at Lindsay, Ont., vice J. D. McMillan, assigned to other duties.

F. W. Kelsey has been appointed assistant superintendent of the Nashville, Chattanooga & St. Louis at Nashville, Tenn., with jurisdiction over the Chattanooga division and its branches. Assistant Superintendent W. G. Templeton will have jurisdiction over the Nashville division and its branches.

Harry W. Forman, formerly and for several years train rule examiner of the Nashville, Chattanooga & St. Louis, and well-known to readers of the *Railway Age Gazette* as a writer on train rules, has been appointed inspector of transportation of the Western Pacific, with headquarters at San Francisco, Cal.

Frank J. Hagner, whose appointment as superintendent of the Shamokin division of the Philadelphia & Reading, has already been announced in these columns, was born on January 8, 1873, at Cressona, Pa., and was educated in the public schools of his native town. He began railway work on November 1, 1887, as an extra telegraph operator on the Philadelphia & Reading, and in June, 1890, became telegraph operator. About one year later he was appointed train despatcher at Cressona, remaining in that position until September, 1899, when he was transferred in the same capacity to Reading. On January 1, 1908, he was appointed chief train despatcher at the same place, and on March 6, 1911, became trainmaster at Allentown, Pa., which position he held at the time of his recent appointment as superintendent of the Shamokin division of the same road, as above noted. Mr. Hagner's entire railway service has been with the Philadelphia & Reading.

F. J. Hagner

Traffic

A. Miranda has been appointed general freight and passenger agent of the Tehuantepec National, Mexico, with headquarters at Rincon Antonio, Oax., vice A. F. D. Schrader, assigned to other duties, effective April 1.

Thomas Edmond Sands, whose appointment as freight traffic manager of the Minneapolis, St. Paul & Sault Ste. Marie has been announced, was born at Albany, N. Y., on January 1, 1869. He was educated in the public and high schools of his native city. On June 25, 1886, he entered railway service as an employee of the Chicago, Minneapolis, St. Paul & Omaha, remaining with that road in various capacities until December, 1888. From the latter date until April 15, 1909, he was successively contracting freight agent, traveling freight agent, chief clerk of the freight traffic department, and assistant general freight agent of the Minneapolis, St. Paul & Sault Ste. Marie. From 1909 until April 1, 1916, he was general freight agent of the same road at Minneapolis. His headquarters as freight traffic manager will also be at Minneapolis.

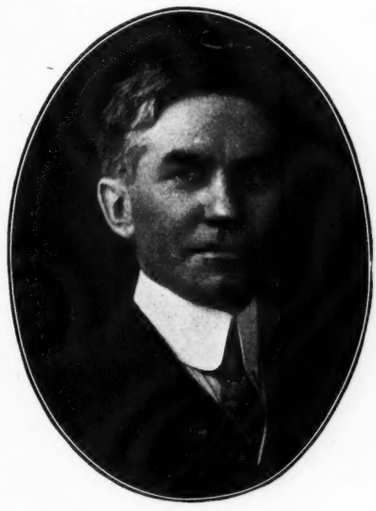
T. E. Sands

J. F. Kane, traveling freight and passenger agent of the Chicago, Milwaukee & St. Paul at Waterloo, Iowa, has been appointed division freight and passenger agent, with office at Cedar Rapids, Iowa, vice W. C. Parker, deceased.

George H. Smitton, assistant general freight agent of the Great Northern at Portland, Ore., has been promoted to assistant traffic manager, with headquarters at St. Paul, Minn., succeeding H. A. Jackson, resigned to accept service with another company, effective April 10.

E. L. Throgmorton, commercial agent of the Illinois Central at Kansas City, Mo., has been promoted to general agent, with headquarters at Havana, Cuba. J. M. Perryman, traveling freight agent with office at St. Louis, Mo., has been appointed commercial agent, with headquarters at Kansas City, vice Mr. Throgmorton.

M. J. McMahon, recently appointed traffic manager of the New Orleans Great Northern, was born at Fall Brook, Pa., on May 21, 1872. He entered railroad service in 1890 as an employee of the Fall Brook Railway at Wellsboro, Pa. Later he became telegraph operator of the Buffalo & Susquehanna at Wellsville, N. Y., and after six months of service was promoted to agent at the same place. He remained in that position for one and one-half years, following which he became division freight and passenger agent of the road at Galeton, Pa. Seven years later he was promoted to assistant general freight and passenger agent, with office at Du Bois, Pa. On January 1, 1911, he entered the service of the New Orleans Great Northern as general freight and passenger agent, with headquarters at New Orleans, La. As traffic manager he will continue to have his headquarters at that city.



M. J. McMahon

Edward G. Clark, recently appointed general freight agent of the Minneapolis, St. Paul & Sault Ste. Marie, with office at Minneapolis, Minn., was born at Howell, Mich., on May 2, 1872. He graduated from high school at Minneapolis in 1891, and in May, 1893, entered the service of the Western Transit Company as stenographer and clerk, remaining in that position until 1896. After being employed as a stenographer for the Wisconsin Central at Minneapolis, and Milwaukee, Wis., he was appointed chief clerk in the general freight office in September, 1897. From May 1, 1899, to January 1, 1901, he was New England agent for the same railroad, with headquarters at Boston, Mass. He returned to Milwaukee as general agent on January 1, 1901, and on December 1, 1902, was appointed assistant general freight agent, with headquarters at the same city. From April, 1909, to April 1, 1916, he was assistant general freight agent of the Minneapolis, St. Paul & Sault Ste. Marie at Minneapolis.

E. G. Clark

Robert C. Wright, freight traffic manager of the Pennsylvania Railroad at Philadelphia, Pa., has been appointed to the new position of traffic manager of lines east of Pittsburgh and Erie, with supervision over both freight and passenger traffic. George D. Ogden, general freight agent at Philadelphia, succeeds Mr. Wright; J. L. Eysmans, assistant general freight agent at Philadelphia, has been appointed general freight agent; J. M. Gross, division freight agent of the Northern division and Western

Pennsylvania division at Pittsburgh, has been appointed assistant general freight agent at Philadelphia; H. A. Haines, division freight agent of the New Jersey division at Philadelphia, succeeds Mr. Gross as division freight agent at Pittsburgh; W. H. H. Willis, division freight agent of the Philadelphia, Baltimore & Washington at Wilmington, Del., succeeds Mr. Haines as division freight agent at Philadelphia, and Robert H. Large, general coal freight agent at Philadelphia, has been promoted to coal traffic manager. Effective May 1.

Engineering and Rolling Stock

H. E. Pierce has been appointed general car foreman of the Illinois Central at Weldon passenger yard, Chicago, vice M. H. Long, deceased.

E. S. Pearce has been appointed assistant mechanical engineer of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Beech Grove, Ind.

R. C. Harding has been appointed bonus supervisor of the Gulf, Colorado & Santa Fe at Cleburne, Tex., vice J. M. Devlin, resigned, to accept service with another company.

L. L. Kelly, resident engineer of the Norfolk & Western, has been promoted to assistant engineer, with office at Norfolk, Va., and W. P. Wiltsee, assistant engineer at Norfolk, has been transferred as assistant engineer to Roanoke.

W. B. Embury, master mechanic of the Chicago, Rock Island & Pacific at Estherville, Iowa, has been appointed master mechanic of the Pan Handle division, with headquarters at Shawnee, Okla., vice W. J. O'Neill, promoted; effective April 10.

W. A. Stockbridge, electrical engineer of the Northwest System of the Pennsylvania Lines West of Pittsburgh, at Ft. Wayne, Ind., has been appointed electrical engineer in the office of the general superintendent of motive power at Pittsburgh, Pa.

OBITUARY

Joel F. Vaile, general counsel of the Denver & Rio Grande, died at Pasadena, Cal., on April 3.

William H. Waters, formerly president of the Maryland Central, now a part of the Maryland & Pennsylvania, died on April 9 at Govans, Md., at the age of 82.

Parker B. Prince, assistant general counsel of the Pennsylvania railroad at Philadelphia, Pa., died on April 7, at his home at Cynwyd, near Philadelphia. Mr. Prince was born on September 18, 1851, at Essex, Mass., and began railway work in 1872 as stenographer to the general solicitor and fourth vice-president of the Pennsylvania Railroad. Shortly afterward he became connected with the legal department and subsequently was made chief clerk in that department. Since March 1, 1895, he served consecutively as chief law clerk, assistant solicitor, assistant general solicitor and assistant general counsel. Mr. Prince's entire service had been with the Pennsylvania Railroad.

F. L. Campbell, superintendent of the Michigan division of the Vandalia, with office at Logansport, Ind., died on April 10 in that city. Mr. Campbell was born at Evansville, Ind., on October 9, 1858, and entered railway service in April, 1879, as a yard clerk of the Vandalia at Terre Haute, Ind. He held various positions in the yard and train service until March, 1894, when he was appointed trainmaster of the Peoria division. From March, 1896, to December, 1901, he was trainmaster and road foreman of engines; from December, 1901, to November 1, 1906, trainmaster of the St. Louis division; from November, 1906, to November 1, 1912, superintendent of the Peoria division. From 1912 until the time of his death he was superintendent of the Michigan division.

FUEL BRIQUET INDUSTRY IN 1915.—Over a million dollars worth of briquets were made from waste coal in 1915, the exact production being 221,537 tons, valued at $1,035,716.

PEANUTS DOWN.—The Atlantic Coast Line, in order to stimulate the movement for crop diversification by encouraging planters along its lines in Alabama to grow peanuts in large quantities, has filed with the public service commission of that State tariffs which reduce by nearly one-half the freight rates on peanuts in the sections in volved.

Equipment and Supplies

LOCOMOTIVES

THE MAINE CENTRAL is in the market for a small number of switching locomotives.

THE WILLIAMSPORT & NORTH BRANCH has ordered one ten-wheel locomotive from the Baldwin Locomotive Works.

THE CUBAN-AMERICAN SUGAR COMPANY, New York, has ordered two Mogul type locomotives from the Baldwin Locomotive Works.

THE NEKOOSKA & EDWARDS PAPER COMPANY, Port Edwards, Wis., has ordered one locomotive from the Davenport Locomotive Works.

THE PENNSYLVANIA STEEL COMPANY, Steelton, Pa., has ordered 2 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE CALIFORNIA STATE BOARD OF HARBOR COMMISSIONERS, San Francisco, Cal., has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

THE SOUTHERN, reported in the *Railway Age Gazette* of March 24 as having issued inquiries for 5 Mountain and 20 Santa Fe type locomotives, has ordered 25 Santa Fe and 15 Mountain type locomotives from the Baldwin Locomotive Works.

THE PEKIN-HANKOW RAILWAY of China has ordered 10 superheater Consolidation locomotives from the American Locomotive Company. These locomotives will have 22 by 26-in. cylinders, 53⅛-in. driving wheels, and a total weight in working order of 166,000 lb.

THE CENTRAL OF NEW JERSEY, reported in the *Railway Age Gazette* of March 24 as being in the market for 5 eight-wheel switching locomotives, has ordered these locomotives from the American Locomotive Company, and will also build 3 eight-wheel switching locomotives in its own shops.

THE EL PASO & SOUTHWESTERN has ordered 2 Mikado freight locomotives from the American Locomotive Company in addition to the 3 mentioned in the *Railway Age Gazette* of February 25. These locomotives are to be similar to those on the former order. They will have 29 by 30-in. cylinders, 63-in. driving wheels, a total weight in working order of 321,000 lb., and will be equipped with superheaters and Street stokers.

FREIGHT CARS

PHELPS, DODGE & CO., New York, are in the market for 6 coke cars.

THE PARIS, LYONS & MEDITERRANEAN has ordered 500 gondola cars from the Pressed Steel Car Company.

THE CHICAGO, BURLINGTON & QUINCY is inquiring for prices on a scale test car 15 ft. in length with four wheels.

THE ANACONDA COPPER MINING COMPANY, Anaconda, Mont., is inquiring for prices on 40 anode rock cars and 2 cathode flat cars.

THE MOUNT UNION REFRACTORIES COMPANY, Mount Union, Pa., has ordered 20 ore cars from the Pressed Steel Car Company.

THE SOLVAY PROCESS COMPANY, Syracuse, N. Y., reported in last week's issue as having ordered 20 hopper cars from the Pressed Steel Car Company, has increased that order to 45 cars.

THE UNITED VERDE COPPER COMPANY, New York, reported in the *Railway Age Gazette* of March 24 as being in the market for 30 ore cars, has ordered 30 tunnel cars from the Pressed Steel Car Company.

THE CALUMET & ARIZONA MINING COMPANY, Warren, Ariz., reported in the *Railway Age Gazette* of March 24 as being in the market for 30 tank cars, has ordered 26 tank cars from the German-American Car Company.

THE ERIE, reported in the *Railway Age Gazette* of March 31 as having ordered 1,000 gondola cars from the Standard Steel Car Company and 500 from another company, ordered this 500 also from the Standard Steel Car Company.

THE FRENCH STATE RAILWAYS have ordered 500 steel car bodies from the Standard Steel Car Company, and are reported to have ordered 1,000 cars, for which inquiries were issued in this country, from a Spanish builder at Barcelona.

THE SOUTHERN RAILWAY, reported in the *Railway Age Gazette* of March 17 and 31 as being in the market for 1,000 box cars, has ordered 1,750 box cars from the American Car & Foundry Company, and 1,500 from the Mount Vernon Car Manufacturing Company. The latter 1,500 cars are for the Mobile & Ohio.

THE CHICAGO, MILWAUKEE & ST. PAUL reported in the *Railway Age Gazette* of February 25 as having issued inquiries for 100 flat cars has ordered 120 50-ton all-steel flat cars from the Bettendorf Company and is also building 75 40-ton logging cars in its Tacoma shops for the Puget Sound & Willapa Harbor, a subsidiary company. This lot of 75 logging cars is in addition to the 150 logging cars which the road was reported as building in its Tacoma shops in the issue of February 25.

PASSENGER CARS

THE CHESAPEAKE & OHIO has ordered 5 dining cars from the Pullman Company.

THE CHICAGO GREAT WESTERN has ordered 2 dining cars from the Pullman Company.

THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY is inquiring for 100 Maxwell traction trucks for street cars.

THE CHICAGO & MILWAUKEE ELECTRIC has ordered 15 passenger car bodies from the Jewett Car Company, and 15 sets of trucks from the Baldwin Locomotive Works.

IRON AND STEEL

THE UNION PACIFIC has ordered 25,000 tons of rails from the Illinois Steel Company.

THE CHESAPEAKE & OHIO has ordered 2,000 tons of rails from the Pennsylvania Steel Company.

THE NORFOLK & WESTERN has ordered 5,000 tons of rails from the Pennsylvania Steel Company.

THE ATLANTIC COAST LINE has ordered 10,500 tons of rails from the Pennsylvania Steel Company.

THE ERIE has ordered 12,000 tons of rails from the Lackawanna Steel Company in addition to 28,000 tons recently ordered from the Steel Corporation.

THE NEW YORK, ONTARIO & WESTERN has divided an order for 4,000 tons of rails between the Lackawanna Steel Company and the Bethlehem Steel Company.

THE PENNSYLVANIA LINES WEST have ordered 500 tons of bridge work from the American Bridge Company, and 700 tons from the Riter-Conley Manufacturing Company.

THE BUFFALO, ROCHESTER & PITTSBURGH has ordered 5,500 tons of rails from the Lackawanna Steel Company, and is reported to have ordered 5,000 to 10,000 tons from other companies.

MISCELLANEOUS

THE GREAT NORTHERN recently purchased between 20,000,000 and 30,000,000 ft. of lumber for the construction of new snow sheds in the Cascade mountains. The order was distributed among several western mills, the Ferry Baker Lumber Company getting a large share of it.

THE PITTSBURGH & LAKE ERIE has awarded a contract to the Roberts & Schaefer Company, Chicago, for the building of four reinforced concrete automatic electric counterbalanced bucket locomotive plants and four electrically operated cinder handling plants, for immediate installation at Monessen, College, Aliquippa and Newell, Pa.

Supply Trade News

The Robinson Connector Company has removed its office from New Haven, Conn., to the works at Branford, which is a suburb of New Haven.

The Track Specialties Company, New York, announces that after April 1 the company will be represented by Parrott & Co., Portland, Ore., in that territory.

W. C. Irwin has been appointed representative of the signal department of the Railroad Supply Company, Chicago, with office at 304 Frisco building, St. Louis, Mo.

The Pressed Steel Car Company and the Western Steel Car & Foundry Company will remove their Chicago sales offices from the Old Colony building to 425 Peoples Gas building on April 15.

E. L. Ruby, for the past five years sales agent of the Hayes Track Appliance Company of Richmond, Ind., has been appointed eastern representative of the company, with headquarters at Philadelphia, Pa.

J. E. M'Lain, district sales manager of the Cambria Steel Company at Pittsburgh, has also been appointed manager of sales in that district for the Worth Brothers Company and the Midvale Steel Company, with offices at 1812 Oliver building.

The McClintic-Marshall Company, Pittsburgh, Pa., has assumed control of the Riter-Conley Manufacturing Company of Leetsville, Pa. The new owners will continue to operate the Riter-Conley Manufacturing Company under its old corporate name.

Lauren J. Drake, for 12 years resident manager at Indianapolis for the Galena Signal Oil Company in charge of the central states territory, has been elected vice-president and a director, succeeding E. H. Baker resigned. Mr. Drake's headquarters will be in New York.

The following have been elected directors of the Midvale Steel & Ordnance Company: John C. Neale, vice-president and general manager of sales of the Cambria Steel Company; E. E. Slick, vice-president and general manager of the Cambria Steel Company, and William B. Dickson, secretary and treasurer of the Midvale Steel & Ordnance Company.

W. D. Smyth, district sales manager of the Cambria Steel Company at Cleveland, Ohio, has also been appointed manager of sales for the Cleveland territory of the Midvale Steel Company and the Worth Brothers Company. The three separate offices now maintained by these companies will be combined June 1 in new offices in the Swetland building.

Thomas Dunbar, manager of the mechanical department of the Pullman Company, Chicago, Ill., has resigned. C. W. Pflager, assistant to the manager of the mechanical department, has been appointed supervisor of the repair shops. Those officers of the construction department, who formerly reported to Mr. Dunbar, will now report directly to Le Roy Kramer, vice-president.

Fred C. Fuller has become associated with the Gustin Bacon Manufacturing Company of Kansas City, Mo., as sales representative. Mr. Fuller has had considerable railroad experience, having been employed in the ticket department of the Atchison, Topeka & Santa Fe from 1901 to 1907, and in the test and inspection department of the same railway from 1909 until April 1, 1916.

Richard Brinsley Sheridan, general manager of the Brown Hoisting Machinery Company, Cleveland, Ohio, has resigned to become one of the executives of the American International Corporation, which recently purchased the Allied Machinery Company of America. He has been succeeded by A. C. Brown, assistant manager and vice-president of the Brown Hoisting Machinery Company.

At the annual meeting of the American Tool Works Company, held at Cincinnati, March 30, the following officers were elected: J. B. Doan, president, succeeding the late Franklin Alter; Robert S. Alter, vice-president and foreign manager; Henry Luers,

secretary and treasurer. The directors are as follows: J. B. Doan, Robert S. Alter, L. E. Voorheis, Clifford Wright and Walter Hofer.

The Hilles & Jones Company, Wilmington, Del., manufacturers of punching and shearing machinery, has purchased the old iron rolling mills adjoining its property, originally the Meidel & Hastings Company, and later operated by the Keystone Steel Company. The old buildings are now being razed to provide space for future development of the Hilles & Jones business. The approximate dimensions of the recently acquired site are 352 ft. by 514 ft.

The Acme Supply Company announces the appointment of Franklin M. Nicholl as sales representative with headquarters at the general sales office, Steger building, Chicago, Ill. Mr. Nicholl has been for the last seven years eastern and Canadian sales representative of the Dayton Manufacturing Company. Previous to that he was for five years sales representative of the O. M. Edwards Company and for a short period salesman for the Curtis Truck Company.

The Bullard Machine Tool Company, Bridgeport, Conn., has placed a contract with the Turner Construction Company, New York, for a continuation along Railroad avenue of a new concrete building now nearing completion, which extends from Allen street to Railroad avenue on Broad street. The present structure is 278 ft. long, 5 stories high and 50 ft. wide. The new building is of similar construction, 110 ft. long, and will replace the four-story brick machine shop which now occupies the site, thus adding largely to the company's manufacturing facilities.

Leigh Beekman Morris, for the past four years New York district sales manager for the Cambria Steel Company, was on April 1 made manager of sales in the New York territory for the Cambria Steel Company, the Midvale Steel Company and Worth Brothers Company. It is expected that the offices of the three companies will be consolidated in New York City, possibly in the City Investing building, 165 Broadway, where the Cambria offices are now located. Mr. Morris has been connected with the sales organization of Cambria Steel Company for about 23 years.

Unfilled Orders Break Last Month's High Record

The Steel Corporation reported unfilled orders on hand March 31 of 9,331,001 tons, an increase of 762,035 tons over the 8,568,966 tons on February 29, which at that time constituted the greatest tonnage of unfilled orders in the history of the corporation. The unfilled tonnage on January 31, 1915, was 7,922,767 tons; on December 31, 7,806,220 tons; on November 30, 7,189,489 tons; on October 31, 6,165,452 tons, and on March 31, 1915, 4,255,749 tons. The corporation is receiving orders at the rate of about 70,000 tons daily, and is shipping about 40,000 tons a day at which rate it now has orders on hand to operate the plants at full capacity for the rest of 1915.

The Fitzhugh-Crowley Corporation

E. H. Fitzhugh and Charles J. Crowley have organized the Fitzhugh-Crowley Corporation to engage in business as engineers, constructors and railway specialists at 60 Broadway, New York City.

Mr. Fitzhugh, who will serve as president of the new corporation, entered railway service in 1873 on the St. Louis, Kansas City & Northern. After serving with various railways, including the Wabash, he went to the Grand Trunk as assistant to Charles M. Hays and aided him in putting into effect the vast physical improvements undertaken under his charge by that system. Later Mr. Fitzhugh became president and general manager of the Central Vermont, in which office he remained until about a year ago.

Mr. Crowley will hold the position of vice-president. He served as division engineer with Mr. Fitzhugh on the Grand Trunk during the reorganization and rehabilitation of that system, and has had a varied experience in railway location, construction and maintenance, terminal and grade revision, and grade separation. He retired from railway service several years ago; and, after some experience as engineer with various contracting concerns on hydro-electric developments and other work, entered the employ of Jacobs & Davies, consulting engineers, of New York, and served as resident engineer on the Pennsylvania tunnels and as engineer and manager of construction of the McAdoo tunnels. He was also superintendent and engineer of the construction of Hale's Bar Dam in the Tennessee River near Chattanooga. Later he was superintending engineer on the subway connecting the Fourth Avenue Subway, Brooklyn, with the Coney Island tracks of the Brooklyn Rapid Transit at 38th street, Brooklyn.

TRADE PUBLICATIONS

STEEL.—The Vanadium-Alloys Steel Company, Latrobe, Pa., has recently issued two folders descriptive respectively of the company's Vasco non-shrinkable tool steel and its Vasco choice tool steel.

DRAWING MATERIALS.—Kolesch & Co., 138 Fulton street, New York, have issued a folder descriptive of the Security tube for protecting and storing blue print paper, tracing paper and cloth and drawing paper.

CEMENT TILE.—The Federal Cement Tile Company, Chicago, has issued an eight-page folder containing drawings and photographs of various types of its cement tiles and methods of laying them, with illustrations of buildings on which this form of construction has been used.

WHARTON SPECIALTIES.—William Wharton, Jr., & Co., Easton, Pa., have issued Bulletin No. 2, describing W-J switch stands, Wharton-O'Brien insulated switch rods and adjustable switch crank, and an insulated gage rod. The descriptions of the various devices are illustrated.

MACHINE TOOLS. Bulletin No. 140 recently issued by the Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, is a manual for the operator's guidance in using Lodge & Shipley engine lathes and attachments. It gives brief descriptions of the different parts of the lathe, instructions for operating, suggestions for handling work, grinding tools, etc.

CHICAGO, UNION PACIFIC AND NORTH WESTERN LINE.—The Department of Tours of the Union Pacific and the Chicago & North Western has issued an especially attractive booklet describing its escorted summer tours for 1916, featuring principally the trips through Yellowstone National Park and the other national parks of the United States and to California.

WIRE. The Standard Underground Cable Company, Pittsburgh, Pa., has devoted Bulletin No. 202-1 to Standard C. C. C. (Colonial Copper Clad) wire. The bulletin tells of the uses for which the wire is adapted and outlines its manufacture. One section contains the specifications for hard drawn C. C. C. wire, 30 per cent and 40 per cent grades, and still another section gives comparisons between C. C. C. wire (standard grade) and other wires.

SIGNALING.—Bulletin No. 128 A, recently issued by the General Railway Signal Company, deals with the A-P-B or absolute permissive block system for single track railways. The booklet touches briefly upon the advantages of automatic block signaling, and shows further wherein the A-P-B system is superior to the older arrangements of automatic block signals for single track operation. A list of the railways using the A-P-B system shows that on March 1, 1916, there were 2,014 miles of line on 14 important steam railways, and 309 miles on seven electric lines on which the system was being used.

STEEL PIPE.—Bulletin No. 26, issued under date of April, 1916, by the National Tube Company, is a book of 52 pages devoted to the subject of "Autogenous Welding of National Pipe." The booklet is very well illustrated, and contains extracts from a number of publications, the various articles dealing respectively with the following subjects: Welding in Gas Distribution; Gas an Important Factor at the Exposition; Welding Suburban Pressure Gas Mains; Welded Pipe Work; Oxy-Acetylene Welding in Pipe Work; Efficiency of the Oxy-Acetylene Welded Joint; Economies of Welded Pipe Connections, Strength of Thermit Welded Pipe; Oxy-Acetylene Welding and Cutting Costs, etc. The various articles and illustrations show how the welding is done, and considerable attention is paid to the advantages of welding pipe on the one hand, and to the strength and general efficiency of National Welded pipe on the other.

Railway Construction

BUFFALO, FORT ERIE FERRY & RAILROAD COMPANY.—The Ontario legislature is being asked to incorporate this company, it is said, with $500,000 capital and office at Fort Erie, Ont., to take over the railway property and rights of the Buffalo & Fort Erie Ferry & Railway Company. The new company also asks for permission to extend the railway from the present western terminus in Bertie township to Port Colborne, and from the terminus in Fort Erie via Bridgeburg to Chippewa, with a branch line to Crystal Beach; and from Fort Erie to any part of Point Albino. Permission is also asked to build wharves at any point where the railway touches navigable waters, and to operate steam or other vessels to run between Ontario and the United States. The company may operate its cars by steam, gasolene or electric power, and may issue bonds for $10,000 a mile. F. V. E. Bardoe, D. McArthur, J. O. Buckley, A. Fasken and G. H. Sedgewick are interested.

CANTON & GRAND LAKE.—The New Brunswick legislature is being asked for incorporation by this company to build a railway from Canton, Sunbury county, New Brunswick, to Syphers Cove, Queen's county, and later to extend the line to Gagetown on the St. John & Quebec. J. S. Armstrong is solicitor for applicants.

CHICAGO, BURLINGTON & QUINCY.—Five miles of second track are being laid between Bagley, Wis., and the Wisconsin river. The work is being handled by company forces, and the filling material is being secured from the Mississippi river by means of suction dredges.

GREAT NORTHERN.—This railroad will continue the improvements near Paola, Mont., partially completed last year. During the season of 1915 a change of line was made in this vicinity, and an old single track tunnel was replaced with a new double track, concrete-lined tunnel. The work to be done this year involves a change of line of about one-half mile, and a new double track, concrete-lined tunnel, 400 ft. in length, to replace another single track tunnel. The present tunnel is on an eight and one-half degree curve, while the new tunnel is on a tangent. The grading of the approaches involves the handling of about 60,000 cu. yd. of material. A. Guthrie & Co., of St. Paul, Minn., who handled the work last year, have the contract for the new work. The cost of the project has been estimated at $125,000. A. H. Hogeland, chief engineer.

LONG ISLAND.—The report of this company for the year ended December 31, 1915, shows that the tunnel section of the Bay Ridge improvement was completed at East New York and was put in operation the latter part of the year. There yet remains to complete the entire work, the yard, float bridges, etc., to be installed at Bay Ridge. It is planned to carry on this work during 1916 and complete it before the middle of 1917. Work on the Jamaica improvement is about finished. There yet remains work which consists of finishing street tunnels under the tracks and some paving, sewerage, etc. The Woodside-Winfield cut-off has been completed and the new line was put in operation during November. The elimination of grade crossings at Bushwick Junction has been completed, and work was started the latter part of the year to abolish grade crossings through Hollis. This work will probably be completed in 1916. The work at Queens, also at Richmond Hill, will be started during the year if financial conditions permit. The New York Public Service Commission, Second district, has ordered the elimination of grade crossings at three points and this work may be started during the year. The cost is to be divided between the railroad, the county and the state. The Commission for the First district has ordered the elimination of eight crossings through Far Rockaway, the city and state to pay half the expense.

MANHATTAN, TOANO & NORFOLK.—The preliminary survey is now being made and rights of way secured for the line to be built to connect Norfolk, Va., and West Point, about 67 miles. F. H. Sprague, vice-president; Saville & Claiborne, Inc., are the engineers, Richmond, Va. (April 7, p. 817.)

VIRGINIAN RAILWAY.—Regarding the report that bids are wanted by this company for building a connecting track between the Virginian Railway and the Southern Railway at Altavista, Va., an officer writes that the present plans are only tentative.

WILLAMETTE PACIFIC.—This road, a subsidiary of the Southern Pacific, 120.6 miles long, extending from Eugene, Ore., west to Siboco and south to Marshfield, has been completed with the exception of a bridge over the Umpqua river. A ferry, which will be used until the expected completion of the bridge in July, enabled the company to inaugurate passenger service on April 5. (February 4, p. 228.)

RAILWAY STRUCTURES

BUFFALO, N. Y.—A new dock for the handling of pig iron and pulpwood and other heavy commodities has been built by the Buffalo, Rochester & Pittsburgh just south of the Buffalo city line on the Buffalo river. The largest vessel on the great lakes can discharge cargo at this dock. It is 580 ft. long and will have three tracks; there is a Brown hoist with magnet crane attachment on the pier. It was necessary to drive piles 65 ft. long for the foundation.

CHICAGO, ILL.—The new Illinois Central office building at Sixty-third street, Chicago, will be nine stories high, and the work calls for a fireproof structure with steel frame, to be of brick, concrete and terra cotta construction. The building adjoins the railroad and the first floor will be used for station purposes, and there will be a few stores to rent. The building will be irregular L shaped, one wing to be about 64 ft. by 135 ft., and the other wing will be about 130 ft. by 150 ft. The estimated cost of the improvement is $500,000. (April 7, p. 818.)

COATESVILLE, PA.—The Philadelphia & Reading has given a contract to P. McManus, Incorporated, Philadelphia, Pa., for the masonry work on a bridge to be built over Brandywine creek at Coatesville. The bridge is to be of steel and concrete construction, and will consist of 4 spans of 23 ft. 3 in. each.

ELLERSLIE, MD.—Four bridges on the main line of the Baltimore & Ohio, Connellsville division, will be replaced by heavier structures to permit the operation of larger locomotives over this section. The bridges to be replaced are at Ellerslie, Md.; Cook's Mill, Pa., Hyndman and Foley.

JERSEY CITY, N. J.—The Lehigh Valley is negotiating with the city officers of Jersey City for a site for the proposed terminal on the Greenville shore of New York bay, between the Pennsylvania freight yards and Caven Point. The plans provide for the purchase of riparian rights out to the pierhead line established by the New York harbor line board in 1915, and the construction of three piers, each 2,000 ft. long, also a lighterage pier. In addition to these piers there will be six shorter ones on the inner channel, each about 1,200 ft. long. Three of these are to be covered and three open. Leading to the piers will be a network of tracks branching off the main stem. There will also be an engine terminal, a roundhouse, car repair yards and storehouses. The reported cost of the improvements will be between $5,000,000 and $8,000,000. If the negotiations are not successful for the above site the railroad may locate the proposed terminal on a site selected as second choice in Bayonne. (March 24, p. 704.)

NEWARK, N. J.—Bids will be asked for in the near future by the Central of New Jersey for putting up a new station on Broad street in Newark. The cost of the new structure will be about $1,000,000.

OGDENSBURG, N. Y.—Bids will be asked for soon by the New York Central for improvements to be carried out at Ogdensburg to eliminate a grade crossing. The work will consist of building a 2-arch bridge to be 190 ft. long, and an approach fill 30 ft. long, to carry highway traffic over the tracks of the railroad. The cost of the improvements will be $75,000, of which the railroad company is to pay one-half, the city one-quarter, and the state one-quarter.

SIOUX CITY, IOWA.—The Great Northern expects to make extensive improvements to its terminal here, and also contemplates the establishment of a new division and engine terminal at Ihlen, Minn. The two projects together will involve an expenditure of about $300,000. A. H. Hogeland, chief engineer.

Railway Financial News

BELT RAILWAY OF CHICAGO.—The annual report of this company for the year ending December 31, 1915, shows total operating revenues of $2,907,472, which is a decrease of $321,508 as compared with 1915, or 9.96 per cent. The decrease is due almost entirely to the reduction in the number of cars handled, which was 1,201,114, as compared with 1,353,466 in 1914. Since August 1, when the 12 trunk line roads that own the stock of the Belt began using the new Clearing yards in the southwestern part of the city of Chicago, for the interchange of cars, cars interchanged via the tracks of the Belt have been hauled to and from the yards by the locomotives of the owning lines, and therefore have not been included in the statement for the total number of cars handled by the Belt. For cars so handled the owning roads have paid to the Belt the actual cost of maintenance and overhead expenses on a wheelage basis. To have included these cars would have added 118,777 to the number handled by the Belt. Total operating expenses were $1,750,375, a decrease of $9,083, or 0.52 per cent. The operating income was $1,017,630, to which should be added miscellaneous income of $388,567, making the gross income $1,406,198. The net income for the year transferred to the credit of profit and loss was $63,943. To this was added the balance at the beginning of the year, $8,048, and a profit on equipment sold, making a total of $72,000, against which was charged a dividend at the rate of six per cent on the outstanding capital stock for five months, or $72,000, leaving no balance in the profit and loss account. The expenditures during the year on the Clearing yard amounted to $655,480, making the total expenditures for this purpose to the end of the year $4,004,329. A total of $422,055 was expended during the year for track elevation. Seventeen new industries were located adjacent to the company's tracks during the year.

CAROLINA, CLINCHFIELD & OHIO.—A stockholders' meeting of the Cumberland Corporation is called for May 8 to pass upon the question of dissolving this company. This company's assets consist of $10,000,000 par value preferred and $25,000,000 par value common stock of the Carolina, Clinchfield & Ohio. The indebtedness is estimated at $5,937,000. Stockholders of the Cumberland Corporation are to be offered common stock of the Carolina, Clinchfield & Ohio at $25 a $100 par value share.

CHICAGO, ROCK ISLAND & PACIFIC.—The minority stockholders' committee, of which N. L. Amster is chairman, has issued a plan of reorganization, the main provisions of which are as follows: Each stockholder is to have the privilege of subscribing to $33 par value of a new issue of either $25,000,000 8 per cent preferred "rights" or 8 per cent 30-year debenture income bonds for each share of stock owned. The new securities are to be convertible into common stock at par up to December 31, 1927. Subscriptions will be payable in four installments, and unless 75 per cent of the subscriptions are made, subscribers may recall or cancel their subscriptions. The proceeds of the sale of the new securities will be used to pay off $11,600,000 short-term collateral notes and $5,100,000 receiver's certificates. The cash which is received from the sale of the new securities will be turned over to the receiver to pay the collateral notes, and when these are paid it will release $16,199,000 first and refunding mortgage bonds and $4,996,000 additional first and refunding mortgage bonds which have been withheld by the trustee. In addition there will be $10,500,000 refunding bonds under the provisions of the mortgage coming to the company in the next three years which may be sold for additions and betterments. Thus the company will have, it is figured, a total of $31,695,000 first and refunding mortgage bonds which it may sell during the next three years for additions and betterments.

Vice-Chancellor Howell has issued an order in the New Jersey Court of Chancery for the dissolution of the Rock Island Company. This is the old New Jersey holding company. According to the terms of the order Chauncey G. Parker, receiver for the Rock Island Company, turns over to Jacob M. Dickinson, receiver for the Chicago, Rock Island & Pacific Railway Company, the interest held by it in the Dallas Union Terminal Company and the Houston Terminal Company, and all the capital stock of the Rock Island Improvement Company and the Rock Island Coal Company. In return Judge Dickinson withdraws a claim for $4,000,000, filed by him against the Rock Island Company, and pays to the Rock Island Company $20,000 in cash and $15,000 in demand notes, which the railway company has been holding.

CINCINNATI, INDIANAPOLIS & WESTERN.—The Public Utilities Commission of Ohio has approved of an issue of $650,000 5 per cent equipment trust certificates, series B, at 99½. The proceeds are to be used for the part payment for 450 forty-ton box cars, 50 forty-ton stock cars, 40 forty-ton flat cars, 100 fifty-ton gondola and hopper cars, 20 cabooses, 5 steel passenger cars, 1 steel dining car and 2 steel postal cars.

CUMBERLAND CORPORATION.—See Carolina, Clinchfield & Ohio.

KANSAS CITY, MEXICO & ORIENT.—The following commitee has been formed for the protection of the 6 per cent notes maturing April 30, 1916: Jozach Z. Miller, governor of the Federal Reserve Bank of Kansas City; Henry Sanderson of C. D. Barney & Co., New York; William J. Gray, vice-president of the First and Old National Bank of Detroit; Herbert F. Hall, of Hall-Baker Grain Company, Kansas City, and Clifford Histed of Harkless & Histed, lawyers of Kansas City.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—The Guaranty Trust Company and Kountze Brothers, both of New York, and Lee, Higginson & Co., Boston, are offering $5,000,000 Minneapolis, St. Paul & Sault Ste. Marie first consolidated mortgage 4 per cent bonds, due July 1, 1938, at 93, yielding about 4.50 per cent interest on the investment. These bonds are guaranteed as to interest by the Canadian Pacific and are secured by a first mortgage on 2,361 miles of line and a second mortgage on 790 miles of line. These bonds recently came back to this country from England and are part of $59,500,000 total outstanding of the issue. They are legal investments for savings banks in New York.

MISSOURI, KANSAS & TEXAS.—The William Church Osborn committee, representing the first mortgage bondholders, has made application to the United States district court in St. Louis asking that the receiver be directed to pay the interest which was due on the bonds December 1, 1915. In accordance with the wishes of all of the interests represented, Judge Adams appointed the United States Trust Company in place of the Central Trust Company as trustee for the first mortgage bonds. The Central Trust Company is seeking to foreclose the consolidated mortgage.

NEW YORK CONNECTING.—Application has been made to the New York Public Service Commission for permission to issue $8,000,000 4½ per cent 40-year bonds, the proceeds to be used for the continuation of the building of this road, which is to give the New York, New Haven & Hartford a connection across Long Island with the Pennsylvania via the Long Island tunnels and via freight ferry across the lower bay. The company is controlled jointly by the New York, New Haven & Hartford and the Pennsylvania.

NEW YORK, NEW HAVEN & HARTFORD.—A press despatch from Boston says that the New York, New Haven & Hartford will shortly sell an issue of short-term notes, probably 4½ per cent. There are $27,000,000 one-year 5 per cent notes falling due May 1, and it is proposed to pay off $2,000,000 of these notes out of current cash.

STATION AGENT'S OPPORTUNITY.—In dealing with the public we should go further than a plain "yes" or "no" in answer to a question. When a man comes to your office and asks for information, you have a great opportunity to talk with him. The business man is usually as ignorant of our business as we are of his, and we should treat his questions in that light. When you get a good chance to talk to a man, give him the information he asks for, and give him something more. Give him all the additional information about the railroad that can help him. That is true service, and that is what you must give if you expect patronage in return.—*George H. Campbell, Assistant to President, Baltimore & Ohio.*